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Deliverable D2.2

Final Structure of the HIGH-TOOL Model

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Glossary

Air-IC	Sub module of the Passenger Demand module for intercontinental air transport
CGE	Computable General Equilibrium
CH	Switzerland
CO_2	Carbon Dioxide
DG MOVE	European Commission's Directorate-General for Mobility and Transport
DG ECFIN	European Commission's Directorate-General for Economic and Financial Affairs
EC	European Commission
EPC	Economic Policy Committee
ETISplus	European Transport Policy Information System
EU	European Union
EU28	28 Member States of the European Union
EUR	Euros
EUROPOP2010	Eurostat Population Projections 2010-based
Eurostat	Statistical Office of the European Union
EXIOBASE	A global, detailed Multi-Regional Environmentally Extended Supply and Use/Input-Output Database.
EXIOMOD	A regional economic model, which allows advanced trade and transport scenario analysis on a national, regional and global scale.
EXIOPOL	Environmental accounting framework, which uses external data and input-output tools for policy analysis.
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GVA	Gross Value Added
HDV	Heavy-Duty Vehicle
HIGH-TOOL	Strategic high-level transport model
HT	HIGH-TOOL
I/O	In-/Output
IPR	Intellectual Property Rights
IWW	Inland Waterway
LDV	Light-Duty Vehicle
NO	Norway
NO_x	Nitrogen Oxides
NST	Eurostat' Standard Goods Classification for Transport Statistics
NUTS	Nomenclature of Territorial Units for Statistics; A number assigned to it defines the level of granularity, such as 0 for the country level.
O/D	Origin/Destination; Used to describe a relation between two regions.
pkm	Passenger-kilometre
PM	Particulate Matter
RAEM	A spatial CGE model for the Netherlands, which explicitly considers interregional transportation and labour flows.

RHOMOLO	Regional Holistic Model
RoW	Rest of World
SO_2	Sulphur Dioxide
TENtec	Information system of the European Commission to coordinate and support the Trans-European Transport Network Policy.
tkm	Tonne-kilometre
TPM	Transport Policy Measure
TPMs	Transport Policy Measures
TRANS-TOOLS	Network-based European Transport Model
TTv3	Research and development of the European Transport Network Model TRANSTOOLS Version 3 (FP7 research project).
vkm	Vehicle-kilometre
WP	Work Package

Executive Summary

This deliverable reflects the work undertaken under *WP2: Structure of the HIGH-TOOL Model* and deals therefore with the second target of the overall project, the development of the final version of HIGH-TOOL. Based on user requirements illustrated by previous project work (Vanherle et al., 2014), user workshops at the client premises, and technical meetings of the consortium, framework conditions for the development of the model structure have been extracted and used to adjust the prototype version. This provided the basis on which to work out the set of tasks necessary to perform a policy measure investigation and to become even more detailed concerning the conceptual and logical structure of the HIGH-TOOL model. The structure defined for the final HIGH-TOOL version is shown in Table 1 whereby the components of the modules are defined.

Table 1: HIGH-TOOL model structure

Module	Components
Demography	Factors & Drivers | Historic data | Net migration | Europop Assumptions Population & Labour Force
Economy & Resources	Economy | Energy & Resources | GDP, Trade, Energy & Resources | Production & Attraction, Distribution (Trade)
Freight Demand	Impedances, Modal Split Parameters, Load Factors, Transit Country Distance Shares | Route Choice | Modal Split | Air Cargo | Conversion
Passenger Demand	Generation | Distribution & Modal Split | Impedances | Value of time, User Costs | Occupancy rates | Urban | Air-IC | Conversion
Vehicle Stock	Economic Factors | Fleet Characteristics | Vehicle Stock, User Costs
Environment	Emission Factors | Technology | Emissions
Safety	Mobility & Crash Data | Base Risk | Causal Variables | Impact Risk
Database	Database Interface
User Interface	Scenario Up-/Download | Policy Translator | Policy Request Report | User Input
Assessment	External Costs | Internal Market | Assessment Generator | Assessment Report

Beside the model structure, the interrelations and the data items to be exchanged have been defined. While the prototype had been developed based on the standard application Microsoft Excel (see Inception Report (Szimba et al., 2013)) the lessons learned from this exercise resulted in the decision to develop the final HIGH-TOOL version in JAVA which allows efficient maintenance as well as flexible access through the Internet. Figure 1 depicts the HIGH-TOOL model structure with the interrelationships among the different modules.

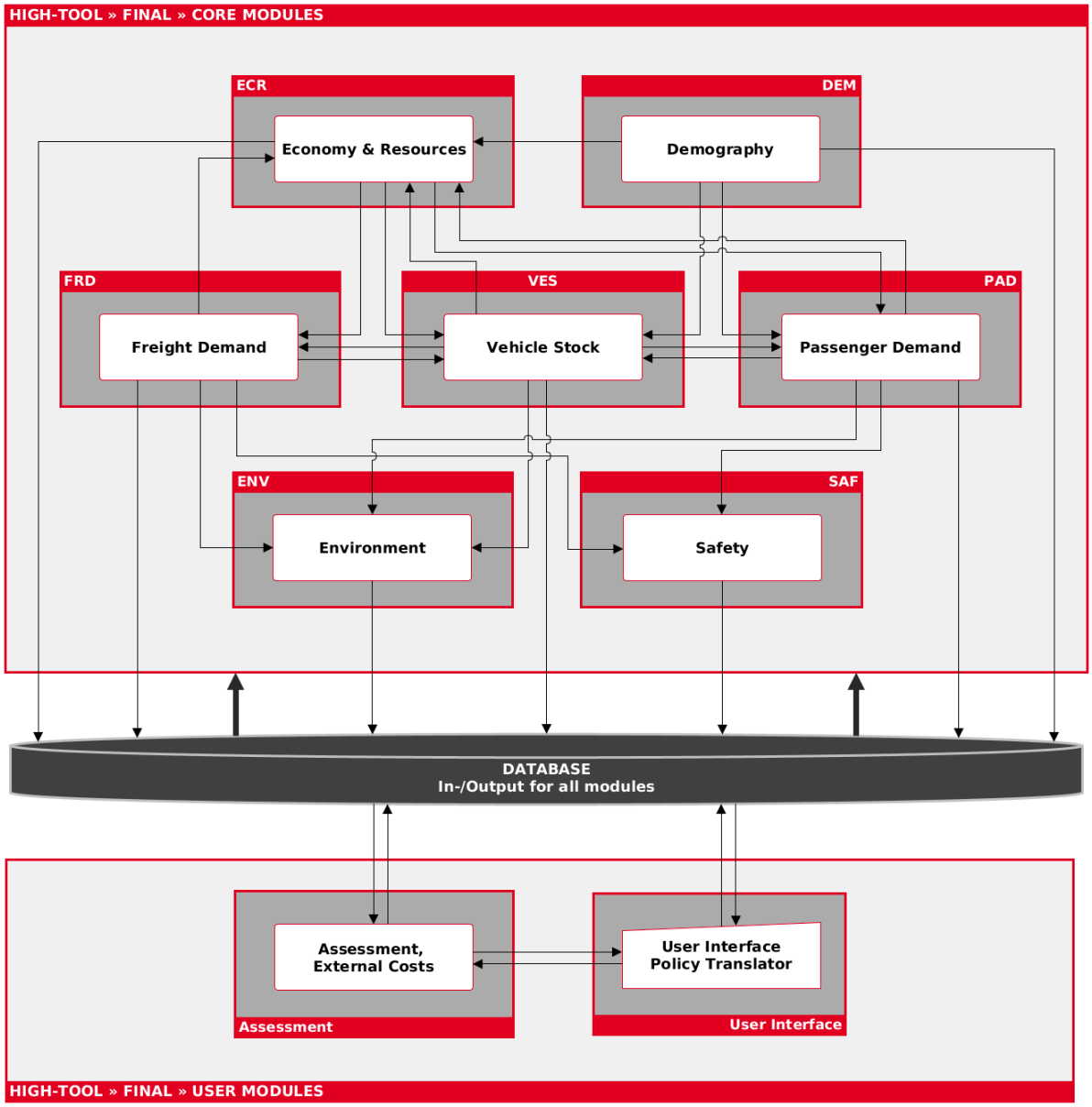

Figure 1: HIGH-TOOL model structure and module interrelationships

1 Introduction

This Deliverable deals with the different steps taken to line out the structure of the HIGH-TOOL model. It summarises work, carried out within the following tasks:

- Task 2.1: Grouping policy and transport relations
- Task 2.2: Model set and tool components to be developed
- Task 2.3: Input and output structure.

It started as a living document and evolved into its final structure by incorporating the permanent feedback from partners of WP1, WP2, WP3, WP4 and WP5. While the first Deliverable D2.1 provides the basic structure for a rapid development of the HIGH-TOOL prototype, the final deliverable of WP2 is represented by the current Deliverable D2.2, documenting the structure of the final HIGH-TOOL model.

This report is structured as follows:

- **Basic model requirements:** The main conclusions from the User Workshop important for the structure of the HIGH-TOOL model are summarised.
- **Structure of the HIGH-TOOL model:** The basic functionality and the model structure are depicted. Furthermore, the internal information flow is outlined and data items to be produced and exchanged are defined.
- **Transport policy measures addressed by the HIGH-TOOL model:** The policy measures HIGH-TOOL can address are displayed in conjunction with their policy levers and the model.

Providing an overview about the HIGH-TOOL model structure and the transport policy measures for assessing policy scenarios is the target of this document. To describe the overall structure of the HIGH-TOOL model it is necessary to dismantle the tool so that the different modules responsible for certain tasks are visible. To enhance the understanding of the working sequence of a module their basic components will be shown as well. Finally the links between the modules and components need to be outlined in detail to document the interfaces necessary for a proper interaction and information flow. With this information the user can recapitulate how the modules work and which interactions finally influence the results a policy measure is triggering. Finally the transport policy measures that the tool can address are outlined and the policy levers that can translate the policies are displayed.

An overview on the context of the HIGH-TOOL model, its features and structure is also provided by Szimba et al., 2015.

2 Basic Model Requirements

The chapter summarizes the key requirements which have been derived from either the call for proposals respectively Description of Work, workshops and surveys undertaken during the life-time of the project. Based on the user requirements identified the technical composition of the equipment was derived.

2.1 Requirements for the Model Structure

According to the call for proposals, the Inception Report (Szimba et al., 2013) and the conclusions of the user workshops concerning user requirements (Vanherle et al., 2014; Purwanto et al., 2015) the main framework has been derived for the HIGH-TOOL model. It is summarised by Table 2.

Table 2: Requirements derived from the tender specification

Model feature	User requirement
Type	Strategic high-level model derived from existing tools, models, equations and elasticities where possible and enriched by new models where necessary; no network model, but due to some policy measures a hyper-network approach reflecting the geographic scope below is available.
Geographic Scope	EU28, Norway and Switzerland on NUTS-2 level plus interrelations with the outside world on a NUTS-0 level for the neighbouring countries and on intercontinental country bundles for the Rest of the World.
Timeline	5-year steps from 2010 to 2050
Modes	Air, rail, road, bus, maritime, inland waterways, including the relevant vehicle technologies.
Transport Types	Passenger by trip purpose (business, private, vacation, commuter; for intercontinental passenger trips only business and non-business). Freight transport commodity (NST2, for air no commodities).
Distance bands	0–300 km, 300–1000 km, 1000+ km
Model Sensitivity	The dependent variables of a module have to be sensitive to a variety of independent variables to cope with the transport policy measures.
Validation	EU Reference Scenario 2013 with highest priority, and supplementary EU transport in figures - Statistical Pocketbook 2012 (published by DG MOVE, reflecting the Member States national statistics). Insofar possible also consistent with ETISplus and TENtec.
Tool	IPR free (except for the MS Office software run by the client), transparent, optimized in terms of runtime, flexible in policy input, user-friendly standalone solution is preferred, web access optional. Linking data and results between HIGH-TOOL and TRANSTOOLS possible (prerequisite is the aggregation of TTv3 data to the geographic scope of HT).

Reflecting upon the requirements above the conceptual framework for the strategic policy assessment tool evolves into a modular approach with seven core modules of the modelling part.

The following seven modules form the core of the modelling part:

- Demography (DEM)
- Economy & Resources (ECR)
- Passenger Demand (PAD)
- Freight Demand (FRD)
- Vehicle Stock (VES)
- Environment (ENV)
- Safety (SAF).

Furthermore, a Database ensures the data exchange between the modules, provides exogenous input for the modules and stores intermediate and output data. Finally, a user interface allows the operation of the model and provides access to assessment results.

2.2 User Requirements on Transport Policies

To determine the major fields of policy a user survey was conducted among policy specialists of the European Commission's Directorate-General Mobility and Transport (DG MOVE). The results show the focus of interest on five policy categories for consideration by the strategic assessment tool and six indicators to assess transport policy impacts, which are displayed in Table 3.

Table 3: Requirements on transport policy measures

Policy categories
Policy measures relating to the objectives of the internal market
Internalisation of external costs
Infrastructure charging
Multimodal transport
Safety

To specify in more detail the different policy categories publications of the European Commission have been investigated to identify transport policy measures (TPMs) which have to be addressed by the HIGH-TOOL model. Chapter 4 summarizes the selected transport policy measures (TPMs).

3 Structure of the HIGH-TOOL Model

This chapter illustrates the final structure of the HIGH-TOOL model. Furthermore, the reported adjustments of the prototype structure outlined in D2.1 (Mandel et al., 2013) have been considered. Compared to the prototype version, the structure of the final version of the HIGH-TOOL model is extended: feedback loops are considered, the content of the modules is extended, the data granularity increased from NUTS-0 to NUTS-2, the neighbouring regions are considered at NUTS-0 level and the "rest of the World" regions are embedded as intercontinental bundles of countries. As the final version is more powerful and has an extended geographic scope, and since the feedback loops increase the computational necessities, an application based on Microsoft Excel was no longer sufficient. Therefore it was decided to use the programming environment JAVA and the database PostgreSQL. This decision enables HIGH-TOOL to remain IPR free[1], avoiding commercial software and to widen the application for web access. Especially the web based server version contributes to an efficient maintenance service and the dissemination of HIGH-TOOL to any person of interest. Furthermore the IPR free characteristic of HIGH-TOOL serves as a research nucleus promoting an intensive use of the database and software to extend the capabilities.

3.1 Modules of the HIGH-TOOL Model

The modular framework for the strategic policy assessment tool consists of seven core modules covering the modelling part, a database to manage the data exchange and storage, and two user modules performing the assessment report and interfacing with the user.

The modules are interlinked as information produced is used in several modules. The general interrelationships among the modules are depicted in Figure 2 in context with the structure of the HIGH-TOOL model.

[1] As the client runs the MS Office software package, the assessment reports are dedicated to this software package to be compatible throughout the work process. Nevertheless, also freely available software packages such as Open Office or Libre Office allows to open the policy assessment reports, with some format differences.

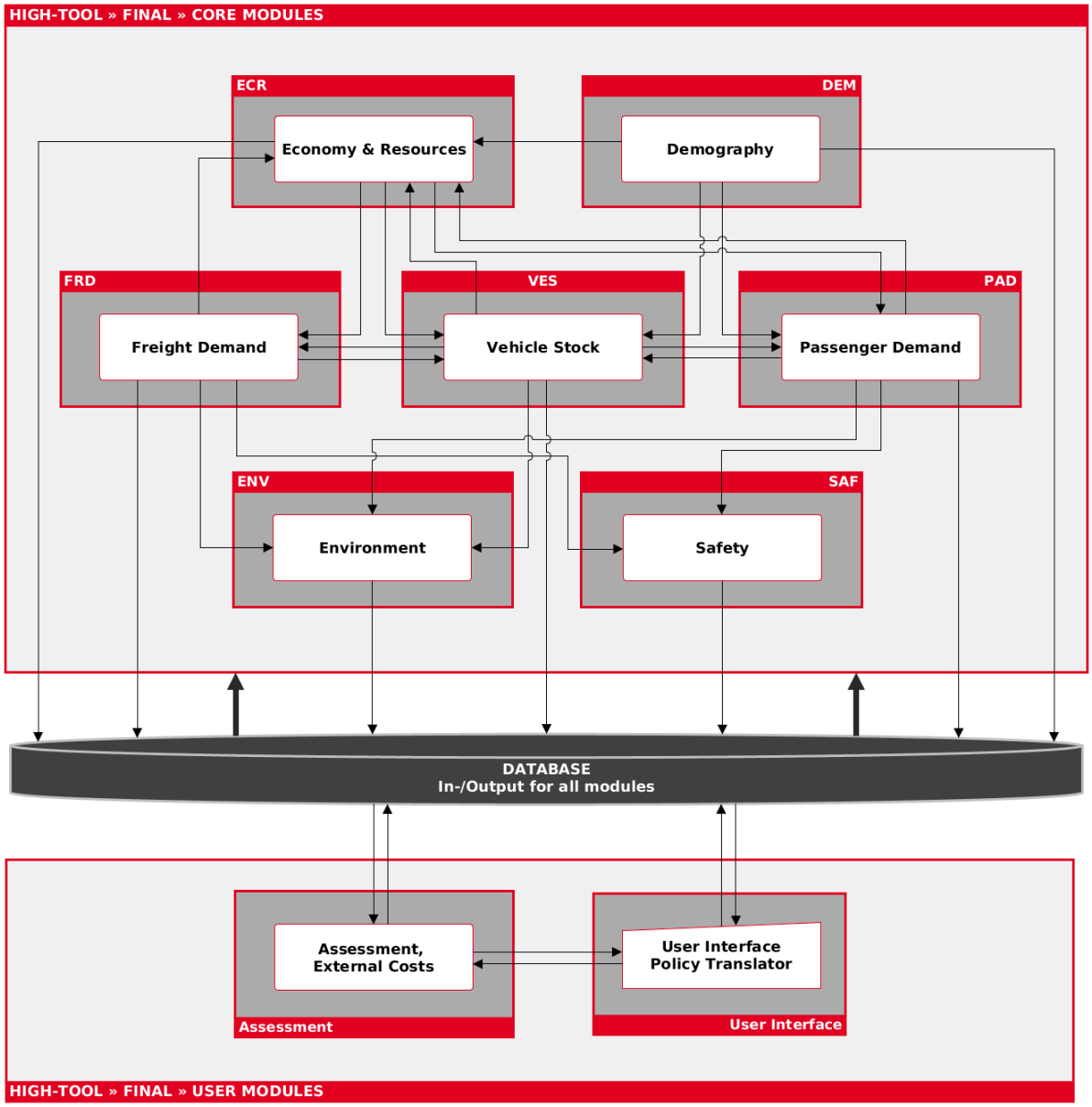

Figure 2: HIGH-TOOL model structure and module interrelationships

3.1.1 Features of the HIGH-TOOL Modules

The HIGH-TOOL model consists therefore of nine modules and a Database as shown in Table 4. The main features of these elements are summarised in Table 4.

Table 4: Main features of the modules of the HIGH-TOOL model

Module	Features in final HIGH-TOOL version
Demography (DEM)	The module deals with the development of the population and its structural changes. It reflects the EU Reference Scenario 2013 (EUROPOP 2010) and breaks down the values to NUTS-2 level.

Module	Features in final HIGH-TOOL version
Economy & Resources (ECR)	The module captures the effects of transport policies upon the economy. It is based on external input at national level (e.g. DG ECFIN projections for the short and medium term, following the agreement reached in the EPC and the EPC/DG ECFIN Ageing Report for the long-run).
Freight Demand (FRD)	The module deals with the mobility of goods and their structural changes under consideration of the available transport infrastructure and transport related policies.
Passenger Demand (PAD)	The module deals with the mobility of the population and its structural changes under consideration of the available transport infrastructure and transport related policies.
Vehicle Stock (VES)	The module deals with the development of the vehicle fleet considering the structural changes over time including propulsion technology.
Safety (SAF)	The module deals with fatalities, injuries, material damage and its changes.
Environment (ENV)	The module deals with emissions caused by transport activities.
Database (DB)	The module is responsible to provide and store all in- and output data of HIGH-TOOL.
Assessment	The module is responsible to generate the assessment report by providing tables and graphs. The assessment includes analyses about the competitive situation among modes and will summarize economic, environmental and transport safety-related impacts. It contains external costs as well as the welfare effects (e.g. changes in generalised costs).
User Interface (UI)	The module is responsible for the interaction with the user and will translate policy requests to be handled by the modules.

Please note that there are several loops between the modules. To cope with the runtime requested by the user to investigate a scenario the decision was taken to use a sequential approach of interaction. The sequential solution reduces the computation loops as the results of the previous periods t-1 would be used as input for calculations of period t[2]. An iterative process would be much more time consuming as the modules would interact, re-compute, store and read data several times until the results for a time period is available and the model moves forward to the next time period. The sequential approach avoids such swapping or data transfers while staying IPR free as requested in the Description of Work as expensive commercial optimization software solutions can be avoided.

3.1.2 Chronological Sequence of Module Calls

The chronological sequence of module calls starts with Demography module (DEM) to produce demographic outputs for t, under consideration of ECR inputs of the time step t-1.

The DEM module provides demographic data at regional level, ensuring consistency with the demographic forecasts underlying the EU Reference Scenario 2013. Demographic trends influence economic performance, passenger transport demand and demand for vehicles. Thus it provides inputs for time step t to ECR, PAD and VES.

[2]Tests are still in process on the feasibility to allow the user a selection whether data for the 5-years intervals shall be produced in one computation step or five steps, the latter reflecting a yearly computation. In both cases the final results will be stored by 5 years steps.

Subsequently Economy & Resources module is run. Since the economic performance and resource consumption is dependent on transport activities, transportation costs, the type of vehicles purchased, as well as the labour force, ECR uses inputs from the modules Vehicle Stock, Passenger Demand, and Freight Demand of time step t-1, and of the DEM module of time step t. The ECR module supplies estimations of economic performance, such as purchase power, employment, and trade as well as of resource consumption. Economic indicators are an important driver of passenger and freight demand, as well as demand for vehicle stock. Thus ECR provides inputs to PAD, FRD and VES for t.

Afterwards VES is activated. Since the composition of the vehicle stock demand is dependent on the economic performance and demographic patterns, as well as on passenger and freight demand, VES receives inputs from ECR and DEM based on year t, PAD and FRD based on year t-1. Furthermore, it delivers outputs to PAD and FRD for time step t in terms of vehicle stock related costs, as well as to the Environment module (ENV) in terms of emission factors.

Following, the PAD and FRD modules are run. Passenger demand is influenced by economic and demographic pattern and thus requires inputs from DEM and ECR (year t). Furthermore, it requires vehicle stock related cost data from VES (year t). PAD's demand data are inputs for the calculation of environmental impacts (ENV) and safety indicators (SAF). Since passenger demand has an impact on the demand for vehicles and economic performance, it delivers demand data for the year t+1 to VES and ECR.

Freight demand is dependent on economic and trade-related characteristics, as well as on vehicle stock related cost data. Thus, ECR and VES provide inputs (year t) to FRD while FRD's demand data are provided to ENV and the Safety module for the computation of environmental and safety impacts. Freight demand has an impact on the demand for vehicles and the economy, thus FRD delivers demand data for the year t+1 to VES and ECR.

For the computation of environmental impacts, ENV applies passenger and freight demand data from PAD and FRD (year t), as well as data on vehicle fleet composition from VES (year t). For the calculation of safety impacts PAD and FRD provide demand data (year t) to SAF.

The tool's base year is 2010. Thus, the first time step 2015 is partly driven by 2010 results and 2020 by 2015 results etc.[3] Figure 3 illustrates the chronological sequence of a model run.

[3] Within the validation process it will be checked whether explicitly the time lag using demand data of t-1 for the computation of VES data of year t causes large differences in the quality of model result.

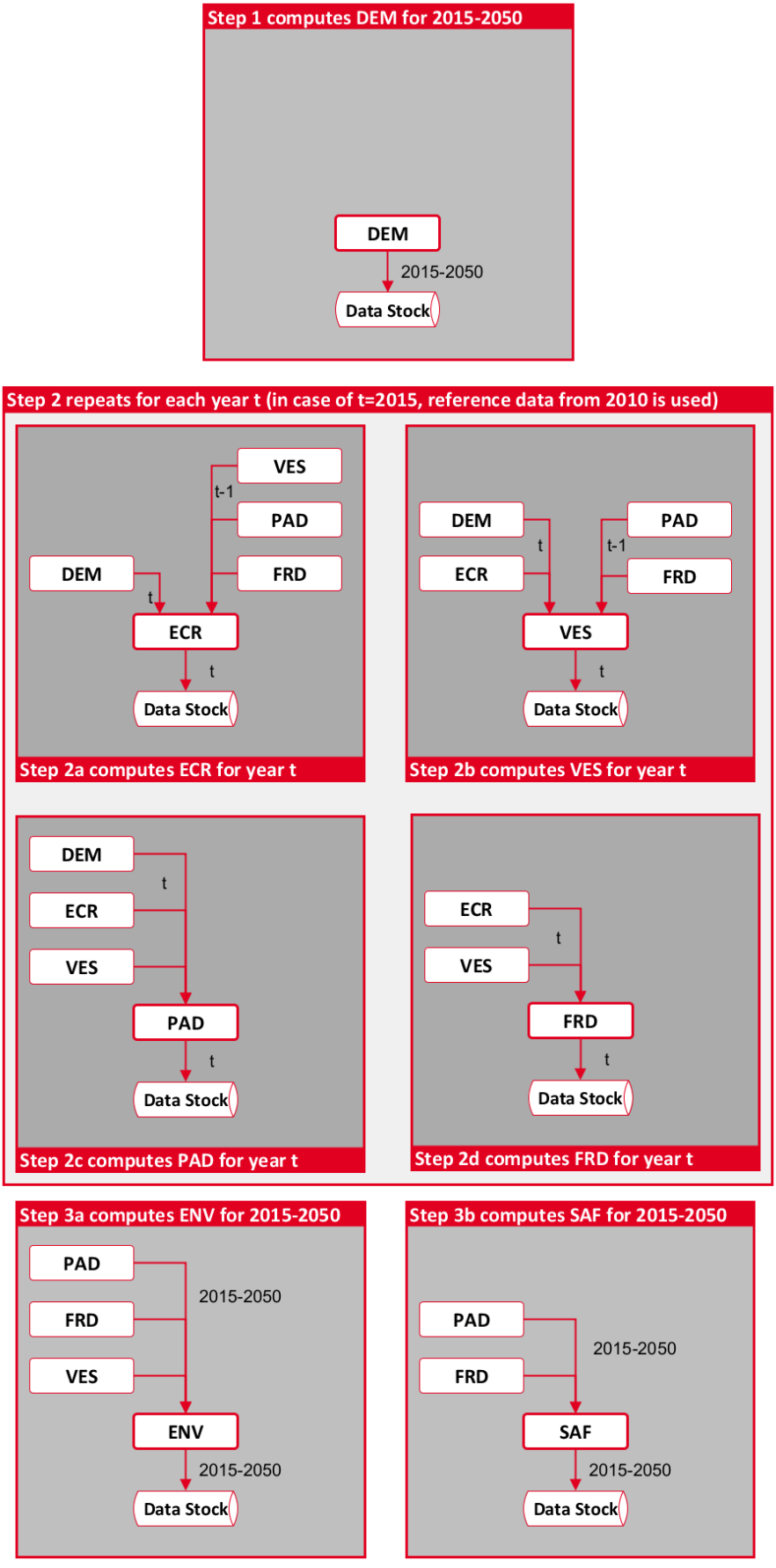

Figure 3: Chronological sequence of a HIGH-TOOL model run

3.2 Structure of the HIGH-TOOL Modules' Input/Output

As each module deals with a variety of policy issues and the problem complexity requires different steps of computation, the internal structure of the modules is structured by "components". As orientation Figure 4 displays the structure of the HIGH-TOOL model with its components and interdependencies. In the following this diversification is outlined textual at an intermediate level[4] and light is shed on the approaches used to generate the modules. Moreover to clarify the interrelationships of the modules the data items and information exchanged are outlined. For each module it is stated from and to where data are transferred and what types of data are delivered. To provide the user a link to the Database content first the variable identifier as listed in the Database is displayed followed by a verbal explanation of the variable.

Concerning the data granulation the model focuses on the EU28 Member States plus Norway and Switzerland on NUTS-2 level, while the neighbouring countries Turkey, Bosnia Herzegovina, Albania, Serbia, Montenegro, Republic of Macedonia, Moldova, Belarus, Ukraine and Russia (west of Urals) are treated on NUTS-0 level. The Rest of the World is reflected by 19 intercontinental bundles consisting out of the countries of the geographic region of the bundle. The intercontinental bundles are defined in Table 5.

Table 5: Intercontinental bundles

Intercontinental bundles
Iceland
Africa North
Africa Central South
Africa East
Middle East Mediterranean
Middle East East
Commonwealth of Independent States
Russia east of Urals
Asia/Pacific Indian Subcontinent
Asia/Pacific Southern Asia
Asia/Pacific Australia/Oceania
Asia/Pacific Far East
America Canada
America USA
America Mexico

[4] The detailed structure of the modules can be found in the dedicated Deliverables of WP4 and WP5.

Intercontinental bundles
America Central
America Caribbean
America South
Antarctica

The latter is not considered further as the traffic originating and destination in this region is out of scope of the HIGH-TOOL model purposes.

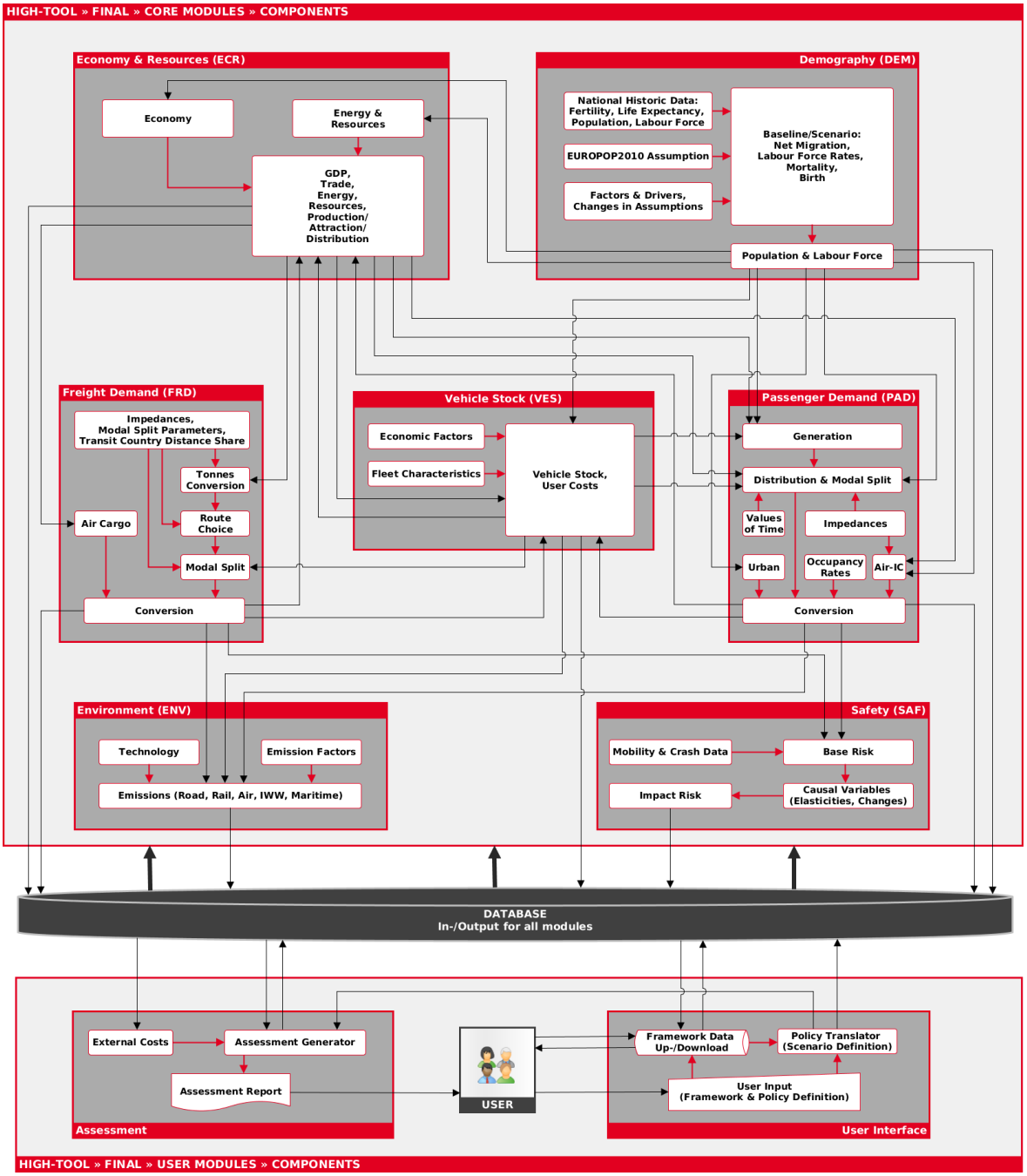

Figure 4: HIGH-TOOL model with its components and interrelationships

As a time horizon the module components deliver results for the period 2010 to 2050 in 5-year steps to meet the runtime requirements.

For a detailed mathematical description of the models the reader is referred to the upcoming Deliverable D4.3 and the Interim Report on the Economy & Resources module (Ivanova, 2015). A detailed description of the Database can be found in D3.1 (Kiel et al., 2015). Deliverable D6.1 (Biosca et al., 2015) outlines the design of the user interface and the assessment reports. Finally the overall HIGH-TOOL model is reflected in the upcoming Deliverable D5.3. The Deliverables stated reflect upon intermediate versions of the final HIGH-TOOL model. Thus, the variables listed in these documents are under revision, while variable names and descriptions listed in Deliverable D2.2 are the final ones as stored in the final database. The Deliverables D4.4, D3.2, D5.3, and D6.2 are upcoming Deliverables referring to the final version of the HIGH-TOOL model and substitute the above mentioned ones.

3.2.1 Demography

The Demography model follows the classical approach of a cohort model. For each of the 30 countries (EU28 plus Norway and Switzerland) demographic drivers are used to estimate the population. Starting point is the component 'Historic Data' displaying information about the historic development 2005 up to 2010 where fertility and mortality rates are extracted which then are extrapolated by the component 'EUROPOP 2010 Assumptions' into the future by using population trends and specifically the EUROPOP2010 NUTS-0 level assumptions on total fertility rate, life expectancies at birth and net migration as well. In this way, the computations are calibrated towards the EU Reference Scenario 2013. Moreover, the component 'Baseline/Scenario' explores intra-national migration growth rates at NUTS-2 level which are derived internally by the module from investigated trends or externally from the user which concern factors, drivers or changes in assumptions (component 'Factors & Drivers, Changes in Assumptions'). Finally the component 'Population & Labour Force' generates the baseline scenario and the last component provides as detailed, output population and labour force per region.

A feedback loop exists within the module Economy & Resources. Concerning the information flow to and from the Demography module the following data items will be exchanged.

Exogenous **input** from Database:

- i_de_labour_hist – Historic labour force (1995–2010) by region if available per age and gender cohort
- i_de_labour_perc – Labour force assumptions in percent by region per age and gender cohort

- i_de_death – Historic number of deaths per country, age and gender cohort
- i_de_pop_disag – Historic shares of population 2010 in percent by region per age and gender cohort
- i_de_pop_eurostat – Historic population (1995–2010) by region, age and gender cohort
- i_de_life_men – Projected life expectancy for men for EU27 + CH + NO
- i_de_life_women – Projected life expectancy for women for EU27 +CH +NO
- i_de_net_migration – Projected net migration (emigration-immigration) for EU27 +CH +NO
- i_de_tot_fert_rate – Projected total fertility rate for EU27 +CH +NO
- i_de_urban – Urbanisation proxy per NUTS-2 region
- i_de_eu_ref – Calibration coefficients for EUROPOP2010 by year, country (EU27 + NO + CH), age groups (0,5, …, 75) and gender (0,1)

Output to the Database:

- o_de_labour – Labour force by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously
- o_de_pop – Projected population by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously

Output to other HIGH-TOOL core modules:

Economy & Resources

- o_de_labour – Labour force by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously
- o_de_pop – Projected population by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously

Vehicle Stock

- o_de_labour – Labour force by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously

Passenger Demand

- o_de_labour – Labour force by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously
- o_de_pop – Projected population by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously

3.2.2 Economy & Resources

The Economy & Resource model is based on the knowledge of three CGE models: EXIOMOD[5], RAEM Europe[6] and RHOMOLO[7]. Due to runtime limitations, the extensive data requirements and a more strategic concept of HIGH-TOOL, the Economy & Resource module is simplified by replacing some components of the above-mentioned models by parameters calibrated based on predefined scenarios by applying a full CGE model. The module consists of the three components 'Economy', 'Energy & Resources', and the combinatorial component 'GDP, Trade, Energy, Resources, Production/Attraction, Distribution' concentrating the module's sensitivity to changes in the socio-economy based on transport related issues. The general drivers (i.e. GDP, household income per capita and population) are exogenously defined by the EU Reference Scenario 2013 and the module will disaggregate these drivers from NUTS-0 to NUTS-2 level based on regional population and labour force. The module provides an estimation and projection of employment, trade, resource consumption and purchase power under different transport policies.

Feedback loops exist within the modules Demography, Passenger and Freight Demand as well as Vehicle Stock. Concerning the information flow to and from the Economy & Resource module the following data items are exchanged.

[5] EXIOMOD is one of a number of regional economic models that allow advanced trade and transport scenario analysis on a national, regional and global scale. The database of EXIOMOD model comes from the FP7-EXIOPOL database (EXIOBASE). For the prototype, EXIOBASE is used as one data source, but for the final version EXIOMOD might be used for more complicated calculation.

[6] RAEM is a spatial CGE model and explicitly considers interregional transportation and labour flows. For the labour market both commuting and migration are taken into account.

[7] RHOMOLO is a new dynamic general equilibrium framework for evaluating EU Cohesion Policy under consideration of environmental and social indicators. The model has both regional and sectoral dimensions regionally, the aim is for complete NUTS-2 (NUTS-1 for Germany) coverage of the EU28, while the potential sector coverage is 23, all of which leads to very large modelling dimensions and presents challenges in terms of data availability. The model is constructed using the concept of Dynamic Spatial Computable General Equilibrium (DSCGE), which ensures Walrasian equilibrium in a sequence of model solutions over time and also incorporates elements of New Economic Geography (NEG) in the way it captures the forces of economic agglomeration and dispersion.

Exogenous **input** from Database:

- p_er_g_gva – Growth rate of gross value added
- p_er_alpha_i – Output elasticity of labour by region and sector, i.e., the share of labour of total Gross Value Added. Used as an input parameter for the Cobb-Douglas function
- p_er_g_gdp – Growth of GDP (2010–2050) by country
- p_er_alpha_i_tot – Output elasticity of labour by country and sector, i.e., the share of labour of total Gross Value Added. Used as an input parameter for the Cobb-Douglas function
- p_er_io – IO-coefficient matrix by region and sectors (year 2010)
- p_er_p – Consumer prices of goods and services
- p_er_beta – Cobb Douglas Utility parameter
- p_er_eta – Sensitivity parameter (in trade)
- p_er_d – Destination parameter (input for the trade gravity model)
- p_er_o – Origin parameter (input for the trade gravity model)
- p_er_epsilon – Elasticity parameter of accessibility by sector, i.e., sensitivity of regional accessibility (e.g. transport costs) to sectoral output
- p_er_tc – Consumption tax rate
- p_er_delta – Depreciation rate
- p_er_phi – Gross fixed capital formation as a percentage of GDP
- p_er_delta_ks_tot – Change in capital supply
- p_er_delta_ls – Change in labour supply
- p_er_gdp_scaler – GDP scaler (Parameter to calculate GDP growth in the policy scenarios.)
- p_er_pd – Producer prices
- p_er_delta_ls_tot – Change in total labour supply
- i_er_delta_acc – Change in accessibility of a region
- i_er_l_tot – Total labour input by region and sector
- i_er_xd_tot – Total output per sector in millions of EUR by country and sector
- i_er_k_tot – Total capital input in millions of EUR by country and sector
- i_er_xd – Total output per region and sector in millions of EUR
- i_er_gva – Gross value added in millions of EUR by country and sector
- i_er_delta_inv – Change in public and private investments into fixed capital formation by region

- i_er_delta_inf_inv – Change in public and private transport infrastructure investments by region
- i_er_delta_rtd – Change in public and private investments in research and technology development (RTD) by region
- i_er_gdp – GDP in millions of EUR by country
- i_er_delata_acc – Change in accessibility of a region
- i_er_sectorshare – Sectoral share per country per year

Endogenous **input** from HIGH-TOOL core modules:

Demography

- o_de_labour – Labour force by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously
- o_de_pop – Projected population by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously

Vehicle Stock

- o_vs_tax_revenues – Generated tax revenues in EUR at country level
- o_vs_purch – Total new vehicle purchase cost in EUR distinguished by modes at country (NUTS-0) level
- o_vs_cstavggen_fix_vkm – Average generalised fixed cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_cstavggen_var_vkm – Average generalised variable cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_veh_stock_n2 – Detailed Vehicle stock in vehicles by region (NUTS-2 level), mode, fuel and vehicle type
- o_vs_vkm_n2 – Detailed generated vkm by region (NUTS-2 level), vehicle type, mode and fuel type

Freight Demand

- o_fd_tkm_od – Tonne kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_total_costs_od – Total transport cost in EUR per tonne by origin/destination at NUTS-2 level per mode, commodity and distance band

- o_fd_vkm_od – Vehicle kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_t_od – Tonnes by origin/destination at NUTS-2 level per mode, commodity and distance band
- i_fd_toll_costs – Average toll cost in EUR/vkm by country and mode

Passenger Demand

- o_pd_pkm_od – Passenger kilometres generated by outgoing trips by origin/destination and mode. Returning trip pkm are not included
- o_pd_vkm_od – Aggregated vkm by origin/destination, region and mode. Returning trip vkm are not included
- o_pd_trips_od – Aggregated trips by origin/destination and mode. Returning trips are not included
- o_pd_od_fix_cost – Fixed cost in EUR generated by outgoing trips by origin/destination and mode. Returning trip costs are not included
- o_pd_od_time_cost – Time cost in EUR generated by outgoing trips by origin/destination and mode. Returning trip costs are not included
- o_od_toll_cost – Toll cost in EUR generated by outgoing trips by origin/destination and mode. Returning trip costs are not included
- o_pd_var_cost – Variable cost in EUR generated by outgoing trips by origin/destination and mode. Returning trip costs are not included
- o_pd_airic_pkm_od – Aggregated passenger kilometres by origin/destination from European regions to RoW regions. Returning trip pkm are not included
- o_pd_airic_costae_od – Aggregated access/ egress costs in EUR from the regions to the airports generated by trips from European region to RoW region.
  Returning trip costs are not included
- o_pd_airic_costnet_od – Aggregated net transport costs in EUR from the regions to the airports generated by trips from European region to RoW region.
  Returning trip costs are not included
- o_airic_trips_od – Aggregated passenger trips by origin/destination from European regions to RoW regions. Returning trips are not included

Output to the Database:

- o_er_gdp – Gross domestic product (GDP) in million EUR

- o_er_gdp_capita – GDP per capita per region
- o_er_cons_capita – Consumption per capita per region
- o_er_labour_new – Labour supply after policy measures in people by region and sector
- o_er_wage_new – Wage (index) after policy measures by region
- o_er_return_new – Return on capital after policy measures by region and commodity
- o_er_income – Income in region in millions of EUR by region
- o_er_PD_new – Production prices of commodities after policy measures by region and commodity
- o_er_P_new – Prices of commodities after policy measures by region and commodity
- o_er_trade_new – Trade after policy measures in millions of EUR from origin region to destination region (at NUTS-2 level) per commodity
- o_er_employment – Employment in people by region and sector
- o_er_income_capita – Income per capita by region
- o_er_co2 – CO_2 emissions without combustion per sector per region
- o_er_sox – SO_x emissions in CO_2 equivalent kg (without combustion) per sector per region
- o_er_nox – NO_x emissions without combustion per sector per region
- o_er_PM – PM emissions in CO_2 equivalent kg (without combustion) per sector per region
- o_er_biomass – Biomass in kilotonnes per sector per region
- o_er_wood – Wood in kilotonnes per sector per region
- o_er_metal_ores – Metal ores in kilotonnes per sector per region
- o_er_water – Water use in Mm^3 (Million cubic meter) per sector per region
- o_er_minerals – Minerals in kilotonnes per sector per region
- o_er_fossilfuel – Fossil Fuels in kilotonnes per sector per region
- o_er_gva – Gross value added in millions of EUR by region and sector
- o_er_hh_consumption – Household consumption in millions of EUR by region and sector
- o_er_int_input – Intermediate inputs in millions of EUR by region and sector
- o_er_prod_tax – Production taxes in millions of EUR by region and sector
- o_er_cap_returns – Capital returns in millions of EUR by region and sector
- o_er_cap_stock – Capital stock in millions of EUR by region and sector
- o_er_output – Total output in millions of EUR by region and sector
- o_er_tot_emissions – Total emissions by region and sector
- o_er_wages – Wages in millions of EUR by region and sector

- o_er_price_index – Welfare measure, price index on commodity level
- o_er_indirect_utility – Indirect utility
- o_er_value – Trade in thousands of EUR from origin region to destination region (NUTS-2) per commodity

Output to other HIGH-TOOL core modules:

Vehicle Stock

- o_er_gdp_capita – GDP per capita per region

Freight Demand

- o_er_trade_new – Trade after policy measures in millions of EUR from origin region to destination region (at NUTS-2 level) per commodity

Passenger Demand

- o_er_gdp – GDP in millions of EUR by region
- o_er_empl – Employment in people by region and sector
- o_er_income – Income in region in millions of EUR by region
- o_er_gva – Gross value added in millions of EUR by region and sector

3.2.3 Freight Demand

The Freight Demand model is divided into three parts dealing with: air cargo, land-/waterbound freight and the conversion of intermediate results. The main part embraces several components to generate the freight types for all modes except air. While the first component 'Impedances, Modal Split Parameters, Transit Country Distance Share' pre-processes impedances, transit shares and external parameters for the three subsequent components generating the freight types for all other modes. The subsequent components convert trade values into tonnes (component 'Tonnes conversion'), execute route choice (component 'Route Choice') and compute the modal split (component 'Modal Split'). The second part consists of an independent component to determine air cargo (component 'Air Cargo'), which is derived from COMEXT data (import and export values) provided by Eurostat for the air mode. The last component 'Conversion' converts al intermediate mode specific results into performance values.

Feedback loops are foreseen with the modules Economy & Resources and the Vehicle Stock modules. Concerning the information flow to and from the Freight Demand module the following data items are exchanged.

Exogenous **input** from Database:

- i_fd_region_share – Country leg distance shares of travelled distance in the country in per-cent by NUTS-2 level origin/destination, country and mode of the total travelled distance
- i_fd_imp_dist – Distance impedances in kilometres by origin/destination at NUTS-2 level per distance band and mode
- i_fd_toll_cost – Average toll cost in EUR/vkm by country and mode
- i_fd_trade_air – Air trade in 2010 in tonnes by region
- i_fd_route_choice – Ton share in percent of route chain at NUTS-2 level, using at most two transhipment points between origin / destination
- p_fd_fixed_cost – Average fixed costs for freight transport in EUR per vkm (no differentiation by country)
- p_fd_var_cost – Average variable costs for freight transport in EUR per vkm (no differentiation by country)
- p_fd_fuel_cost – Average energy costs for freight transport in EUR per vkm (no differentiation by country)
- p_fd_load_factor – Average load rate for freight transport in EUR per vkm (no differentiation by country)
- p_fd_load_capacity – Average load capacity for freight transport in EUR per vkm (no differentiation by country)
- p_fd_speed – Average speed for freight transport in EUR per vkm (no differentiation by country)
- p_fd_load_time – Average loading time for freight transport in EUR per vkm (no differentiation by country)
- p_fd_unload_time – Average unloading for freight transport in EUR per vkm (no differentiation by country)
- p_fd_wait_time – Average waiting time for freight transport in EUR per vkm (no differentiation by country)
- p_fd_utilities- Mode utility function parameter per commodity
- p_fd_air_param – Air demand annual growth factor depending on origin/destination relationship
- p_fd_trade_value – Commodity value in EUR (2010 constant prices) by origin country/ destination country
- p_fd_air_share_full_freight – Share of freight transported by air cargo liners

Endogenous **input** from HIGH-TOOL core modules:

Economy & Resources

- o_er_trade_new – Trade after policy measures in millions of EUR from origin region to destination region (at NUTS-2 level) per commodity

Vehicle Stock

- o_vs_cstavggen_fix_tkm – Average generalised fixed cost in EUR per tonne kilometre by country, mode and fuel type
- o_vs_cstavggen_var_vkm – Average generalised variable cost in EUR per vehicle kilometre by country, mode and fuel type

Output to the Database:

- o_fd_tkm_od – Tonne kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_vkm_od – Vehicle kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_t_od – Tonnes by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_total_cost_od – Total transport cost in EUR per tonne by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_vkm_transit – Freight mobility in a country including transit in vehicle kilometres by country, distance band and mode
- o_fd_tkm_transit – Freight performance on the territory of a country including transit in tonne kilometres by country, distance band and mode
- o_fd_air_demand_od_t – Air demand projected transported in full freight aircraft in tonnes by origin/destination at NUTS-2 level
- o_fd_air_demand_od_tkm – Air demand performance transported in full freight aircrafts in tonne kilometres by origin/destination at NUTS-2 level
- o_fd_air_demand_od_vkm – Air demand mobility transport in full freight aircrafts in vkm by origin/destination at NUTS-2 level
- o_fd_air_demand_t_od – Total air demand projected in tons by origin/destination at NUTS-2 level

Output to other HIGH-TOOL core modules:

Economy & Resources

- o_fd_tkm_od – Tonne kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_total_costs_od – Total transport cost in EUR per tonne by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_vkm_od – Vehicle kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band
- o_fd_t_od – Tonnes by origin/destination at NUTS-2 level per mode, commodity and distance band
- i_fd_toll_costs – Average toll cost in EUR per vkm by country and mode

Vehicle Stock

- o_fd_vkm_od – Vehicle kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band
- p_fd_load_factor – Average load rate for freight transport in EUR per vkm (no differentiation by country)
- p_fd_load_capacity – Average load capacity for freight transport in EUR per vkm (no differentiation by country)

Environment

- o_fd_vkm_od – Vehicle kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band

Safety

- o_fd_vkm_transit – Freight mobility in a country including transit in vehicle kilometres by country, distance band and mode

3.2.4 Passenger Demand

The Passenger Demand model follows largely the classical “four-step approach” of transport demand modelling (without the fourth step, network assignment) and consists of the three components: ‘Generation’, ‘Distribution & Modal split’ and ‘Conversion’. The generation model computes the trip demand for each origin. The distribution model calculates the O/D trip matrix and the modal split model further distinguishes the O/D matrix by transport modes whereby the components ‘Values of Time’ and ‘Impedances’ provide necessary information.

The component 'Impedances' also delivers information to the component 'Air-IC' which generates the intercontinental air transport demand. The urban transport demand is computed by the component 'Urban'. All aforementioned components conclude with the component 'Conversion' which converts the intermediate results into outputs for other HIGH-TOOL core modules and the Database.

A hyper-network approach is utilized for rail and road to allow corridor scenarios on an abstract level. The capitals of each zone are used as network nodes and a hyper-network link connects two neighbouring zones if they are connected via rail or road. Policies can influence time and distance weights in the network. Changes in times and distances on O/D level are used to change the reference impedance matrices from ETISplus.

There are feedback loops with the modules Economy & Resources and Vehicle Stock. Concerning the information flow to and from the Passenger Demand module the following data items are exchanged.

Exogenous **input** from Database:

- i_pd_coef_transitshare – Static transit share factor by origin/destination, country and mode (not used if hypernet submodule is active)
- i_pd_coef_occupancy_rate – Occupancy rate for car by country, purpose and mode
- i_pd_imp_net_time – Network travel time in minutes by origin/destination and mode
- i_pd_imp_ae_time – Access/egress travel time in minutes by origin/destination and mode
- i_pd_imp_net_dist – Network travel distance in kilometres by origin/destination and mode
- i_pd_imp_ae_dist- Access/egress travel distance in kilometres by origin/destination and mode
- i_pd_imp_delta_los – Level of Service indicator by origin/destination and mode
- i_pd_imp_ref_dist – Crow flies distance in kilometres by origin/destination
- i_pd_exogenous_hotel – Number of hotels by region
- i_pd_exogenous_bed – Number of accommodation opportunities by region
- i_pd_exogenous_area – Region area in square kilometres by region
- i_pd_exogenous_radius – Average region radius in kilometres by region
- i_pd_ref_dist – Average trip length in kilometres by urban mode in the reference year 2010
- i_pd_core_toll_cost – Average passenger transport toll costs in EUR per vkm by country and mode
- i_pd_citydwellershare – Percentage of NUTS-2 population living in cities and direct catchment areas

- i_pd_referencedemand – Observed trip demand per capita per day in the reference year 2010
- i_pd_aecost – Access/egress costs in EUR by air intercontinental origin/destination and air purpose for the reference year 2013
- i_pd_aircost – Ticket costs in EUR by air intercontinental origin/destination and air purpose for the reference year 2013
- i_pd_aetime – Access/egress time in minutes by air intercontinental origin/destination and air purpose for the reference year 2013
- i_pd_airmodetime – Flight time in minutes by air intercontinental origin/destination and air purpose for the reference year 2013
- i_pd_freq – Level of service frequency by air intercontinental origin/destination and air purpose for the reference year 2013
- i_pd_airdist – Flight distance in kilometres by air intercontinental origin/destination and air purpose for the reference year 2013
- i_pd_referenceflow – Observed travellers in reference year by air intercontinental origin/destination and air purpose for the reference year 2013
  (returning trips are not included)
- i_pd_referencepopulation – Population in the reference year 2013 by region
- i_pd_urban_duaetime – Policy lever for change in access/ egress time for urban passenger transport modes, in percent
- i_pd_urban_dutoll – Policy lever for change in urban cordon toll costs for passenger cars and powered 2-wheelers
- i_pd_urban_dutraveldist – Policy lever for change in travel distance for urban passenger transport modes, in percent
- i_pd_urban_dutraveltime – Policy lever for change in travel time for urban passenger transport modes, in percent
- i_pd_capital – Name of zone capital
- i_pd_capital_lat – Latitude of zone capital
- i_pd_capital_long – Longitude of zone capital
- i_pd_ae_dist – Access/egress travel distance to network in kilometres by region and mode
- i_pd_ae_dist_weight – Policy lever for change in passenger transport access/ egress distance to the hypernet by region and mode, in percent
- i_pd_ae_time – Access/egress travel time to network in minutes by region and mode

- i_pd_ae_time_weight – Policy lever for change in passenger transport access/ egress time to the hypernet by region and mode, in percent
- i_pd_link_dist – Passenger transport net distance by hypernet link and mode
- i_pd_link_dist_weight – Policy lever for change in passenger transport net distance by hypernet link and mode, in percent
- i_pd_link_time – Passenger transport net time by hypernet link and mode
- i_pd_link_time_weight – Policy lever for change in passenger transport net time by hypernet link and mode, in percent

Endogenous **input** from HIGH-TOOL core modules:

Demography

- o_de_labour – Labour force by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously
- o_de_pop – Projected population by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously

Economy & Resources

- o_er_gdp – GDP in millions of EUR by region
- o_er_empl – Employment in people by region and sector
- o_er_income – Income in region in millions of EUR by region
- o_er_gva – Gross value added in millions of EUR by region and sector

Vehicle Stock

- o_vs_veh_stock – Detailed vehicle stock in vehicles by country, mode, fuel and vehicle type
- o_vs_cstavggen_fix_vkm – Average generalised fixed cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_cstavggen_var_vkm – Average generalised variable cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_cstavggen_fix_pkm – Average generalised fixed cost in EUR per passenger kilometre by country, mode and fuel type
- o_vs_cstavggen_var_pkm – Average generalised variable cost in EUR per passenger kilometre by country, mode and fuel type

Output to the Database:

- o_pd_od_fix_cost – Fixed cost in EUR generated by outgoing trips by origin/destination and mode. Returning trip costs are not included
- o_pd_od_time_cost – Time cost in EUR generated by outgoing trips by origin/destination and mode (returning trip costs are not included)
- o_pd_od_toll_cost – Toll cost in EUR generated by outgoing trips by origin/destination and mode. Returning trip costs are not included
- o_pd_od_var_cost – Variable cost in EUR generated by outgoing trips by origin/destination and mode. Returning trip costs are not included
- o_pd_orig_fix_cost – Fix cost in EUR generated by trips by origin region and mode
- o_pd_orig_time_cost – Time cost in EUR generated by trips by origin region and mode
- o_pd_orig_toll_cost – Toll cost in EUR generated by trips by origin region and mode
- o_pd_orig_var_cost – Variable cost in EUR generated by trips by origin region and mode
- o_pd_transit_fix_cost – Aggregated total fixed costs in EUR including transit by country and mode
- o_pd_transit_time_cost – Aggregated total time costs in EUR including transit by country and mode
- o_pd_transit_toll_cost – Aggregated total toll costs in EUR including transit by country and mode
- o_pd_transit_var_cost – Aggregated total variable costs in EUR including transit by country and mode
- o_pd_pkm_od – Passenger kilometres generated by outgoing trips by origin/destination and mode. Returning trip pkm are not included
- o_pd_pkm_orig – Passenger kilometres generated by trips by origin region and mode. Returning trip pkm are not included
- o_pd_pkm_transit – Aggregated total passenger kilometres including transit by country and mode
- o_pd_vkm_od – Aggregated vkm by origin/destination, region and mode. Returning trip vkm are not included
- o_pd_vkm_orig – Aggregated vkm by origin region and mode
- o_pd_vkm_transit – Aggregated total vkm including transit by country and mode
- o_pd_trips_od - Aggregated trips by origin/destination and mode (returning trips are not included)

- o_pd_trips_orig – Aggregated trips by origin region and mode
- o_pd_urban_pkm_ctry – Total urban passenger kilometres by country, urban mode, simple age group and gender
- o_pd_urban_vkm_ctry – Total urban vehicle kilometres by country, urban mode, simple age group and gender
- o_pd_urban_trips_ctry – Total urban trip demand by country, urban mode, simple age group and gender
- o_pd_pkm_transit_safety – Aggregated total passenger kilometres including transit by country, mode, simple age groups and gender
- o_pd_pkm_orig_safety – A Aggregated passenger kilometres by origin, mode, simple age groups and gender
- o_pd_trips_orig_safety – Aggregated trips by origin region, mode, simple age groups and gender cohort
- o_pd_airic_costae_od – Aggregated access/egress costs in EUR from the regions to the airports generated by trips from European region to RoW region (returning trip costs are not included)
- o_pd_airic_costnet_od – Aggregated net transport costs in EUR from the regions to the airports generated by trips from European region to RoW region (returning trip costs are not included)
- o_pd_airic_pkm_od – Aggregated passenger kilometres by origin/destination from European regions to RoW regions (returning trip pkm are not included)
- o_pd_airic_trips_od – Aggregated passenger trips by origin/destination from European regions to RoW regions (returning trips are not included)
- o_pd_vkmdistancebandctry – Aggregated vkm by originating country, distance band, mode
- o_pd_pkmdistancebandctry – Aggregated pkm by originating country, distance band, mode
- o_pd_imp_aenet_dist – Modelled access/egress travel distance in kilometres by region and mode
- o_pd_imp_aenet_time – Modelled access/egress travel time in minutes by region and mode
- o_pd_imp_hnet_dist – Modelled network travel distance in kilometres by region and mode
- o_pd_imp_hnet_time – Modelled network travel time in minutes by region and mode

Output to other HIGH-TOOL core modules:

Economy & Resources

- o_pd_pkm_od – Passenger kilometres generated by outgoing trips by origin/destination and mode (returning trip pkm are not included)
- o_pd_vkm_od – Aggregated vkm by origin/destination, region and mode(returning trip pkm are not included)
- o_pd_trips_od – Aggregated trips by origin/destination and mode(returning trip pkm are not included)
- o_pd_od_fix_cost – Fixed cost in EUR generated by outgoing trips by origin/destination and mode (returning trip costs are not included)
- o_pd_od_time_cost – Time cost in EUR generated by outgoing trips by origin/destination and mode (returning trip costs are not included)
- o_od_toll_cost – Toll cost in EUR generated by outgoing trips by origin/destination and mode (returning trip costs are not included)
- o_pd_var_cost – Variable cost in EUR generated by outgoing trips by origin/destination and mode (returning trip costs are not included)
- o_pd_airic_pkm_od – Aggregated passenger kilometres by origin/destination from European regions to RoW regions (returning trip pkm are not included)
- o_pd_airic_costae_od – Aggregated access/ egress costs in EUR from the regions to the airports generated by trips from European region to RoW region
  (returning trip costs are not included)
- o_pd_airic_costnet_od – Aggregated net transport costs in EUR from the regions to the airports generated by trips from European region to RoW region
  (returning trip costs are not included)
- o_pd_airic_trips_od – Aggregated passenger trips by origin/destination from European regions to RoW regions (returning trips are not included)

Vehicle Stock

- i_pd_coef_occupancy_rate – Occupancy rate by country, purpose and mode
- o_pd_vkm_od – Aggregated vkm by origin/destination, region and mode
  (returning trip pkm are not included)
- o_pd_airic_pkm_od – Aggregated passenger kilometres by origin/destination from European regions to RoW regions (returning trip pkm are not included)

- o_pd_airic_trips_od – Aggregated passenger trips by origin/destination from European regions to RoW regions (returning trips are not included)
- o_pd_urban_vkm_ctry – Total urban vehicle kilometres by country, urban mode, simple age group and gender

Environment

- o_pd_vkm_od – Aggregated vkm by origin/destination, region and mode (returning trip pkm are not included)
- o_pd_airic_pkm_od – Aggregated passenger kilometres by origin/destination from European regions to RoW regions (returning trip pkm are not included)
- o_pd_urban_vkm_ctry – Total urban vehicle kilometres by country, urban mode, simple age group and gender

Safety

- o_pd_pkm_transit_safety – Aggregated total passenger kilometres including transit by country, mode, simple age groups and gender
- o_pd_vkm_transit– Aggregated total vkm including transit by country and mode
- o_pd_trips_orig_safety – Aggregated trips by origin region, mode, simple age groups and gender cohort
- o_pd_urban_pkm_ctry – Total urban passenger kilometres by country, urban mode, simple age group and gender
- o_pd_urban_vkm_ctry – Total urban vehicle kilometres by country, urban mode, simple age group and gender
- o_pd_airic_trips_od – Aggregated passenger trips by origin/destination from European regions to RoW regions (returning trips are not included)

3.2.5 Vehicle Stock

The Vehicle Stock model consists of three components. The component 'Economic Factors' and the component 'Fleet Characteristics' generate data for the component, 'Vehicle Stock, User Costs'. The latter component generates the vehicle stock in combination with the user costs. The vehicle stock generation is based on historic data reflecting the vehicle portfolios characteristics such as age, type, propulsion technology and size.

The computation of user costs is also based on historic information about mode specific energy consumption and vehicle costs under consideration of propulsion technologies. The natural dynamic of the model is ensured by considering the scrappage and sales trends for vehicles.

There are feedback loops within the modules Economy & Resources as well as Passenger and Freight Demand. Concerning the information flow to and from the Vehicle Stock module the following data items are exchanged.

Exogenous **input** from Database:

- i_vs_cap_rpcs_mkt – Average vehicle purchase price (incl. VAT) in EUR by country, mode, vehicle type and fuel
- i_vs_cap_rpcs_vat – Average vehicle purchase VAT in EUR by country, mode, vehicle type and fuel
- i_vs_cap_tech – Average technology related additional cost in EUR by country, mode, vehicle type and fuel
- i_vs_cap_subsidy – Average state subsidy to buy (cleaner) vehicles in EUR by country, mode, vehicle type and fuel
- i_vs_scrap_subs – Average state subsidy to scrap old or high polluting vehicles in EUR by country, mode, vehicle type and fuel
- i_vs_cstiww – Average inland waterways generalised costs in EUR per vkm by country, mode, vehicle type and fuel
- i_vs_fu_ct – Carbon tax in EUR per tonne CO_2 by country, mode and vehicle fuel
- i_vs_fu_fuel_resource_toe – Energy resource cost in EUR by country, mode, vehicle fuel
- i_vs_fu_fuel_vat – Fuel value added tax (VAT) in percent by country, mode and vehicle fuel
- i_vs_fu_exduty_eur_1000l – Fuel excise duty data given in EUR per 1000 l by country, mode and vehicle fuel
- i_vs_fu_exduty_eur_1000kg – Fuel excise duty data given in EUR per tonne by country, mode and vehicle fuel
- i_vs_fu_exduty_eur_gj – Fuel excise duty data given in EUR per gigajoule fuel by country, mode and vehicle fuel
- i_vs_fu_exduty_eur_kwh – Fuel excise duty data given in EUR per kilowatt hour by country, mode and vehicle fuel
- i_vs_nf_air_neoe_pas – Non-energy related variable air passenger costs in EUR per tkm by mode, vehicle type and fuel

- i_vs_nf_air_neoe_fre – Non-energy related variable air freight costs in EUR per tkm by mode, vehicle type and fuel
- i_vs_nf_mar_chcost – Annual cargo handling costs (loading, discharge, cargo claims) in EUR by mode, vehicle type and fuel
- i_vs_nf_mar_oi_vcost – Annual voyage costs (port and light dues, tugs and pilotage, canal dues) in EUR by mode, vehicle type and fuel
- i_vs_nf_mar_opcost – Annual non-fuel related operational costs (daily manning, stores, routine repair and maintenance, insurance and administration) in EUR by mode, vehicle type and fuel
- i_vs_nf_mar_repmaintc – Annual periodic maintenance costs (temporary dry-docking for regular and special surveys) in EUR by mode, vehicle type and fuel
- i_vs_nf_rail_crec – Crew cost in EUR per hour by mode, vehicle type and fuel
- i_vs_nf_rail_damc – Damage load cost in EUR per train by mode, vehicle type and fuel
- i_vs_nf_rail_othc – Other costs in EUR per tkm by mode, vehicle type and fuel
- i_vs_nf_rail_repmaintc – Repair and maintenance costs in EUR per vkm by mode, vehicle type and fuel
- i_vs_nf_cstinsu – Insurance costs in EUR per vkm by country, mode, vehicle type and fuel
- i_vs_nf_road_repmaintc – Average repair and maintenance costs in EUR per vkm by country, mode vehicle type and fuel
- i_vs_nf_rof_cst_labo – Average labour costs in EUR per tkm by country, mode, vehicle type and fuel
- i_vs_nf_rof_cst_othr – Average other non-fuel operational costs in EUR per tkm by country, mode, vehicle type and fuel
- i_vs_nf_rof_cst_time – Average non-fuel operational time costs in EUR per tkm by country, mode, vehicle type and fuel
- i_vs_nf_taxfuel – Average additional fuel tax in EUR per tkm by country, mode, vehicle type and fuel
- i_vs_nf_taxinsu – Average insurance tax in EUR per tkm by country, mode, vehicle type and fuel
- i_vs_nf_taxown – Average ownership tax in EUR per tkm by country, mode, vehicle type and fuel
- i_vs_nf_taxregs – Average registration tax in EUR per tkm by country, mode, vehicle type and fuel

- i_vs_veh_stock – Input vehicle stock in thousands by country, mode, vehicle type and fuel
- i_vs_veh_stock_age – Input vehicle stock by age in thousands by country, mode, vehicle type, fuel and technology (age cohort)
- p_vs_surv_scrap – Vehicle scrappage rate
- p_vs_surv_depriv – Vehicle deprivation rate
- p_vs_logit_elast – Vehicle type related elasticity for the logit model
- p_vs_fu_emfactor: Emission factor as described in the EU Energy Tax Directive (ETD): minima of excise duty
- p_vs_fu_nrg_content – Energy content of fuels
- p_vs_fu_toe – Tonnes of oil equivalent per litre of fuel
- p_vs_rail_spec_whour – Total yearly working hours of rail vehicles by type

Endogenous **input** from HIGH-TOOL core modules:

Demography

- o_de_pop – Projected population by region (EU28 + CH + NO), age and gender cohort. RoW outputs prefilled from UN projections exogenously

Economy & Resources

- o_er_gdp_capita – GDP per capita per region

Freight Demand

- o_fd_vkm_urban (for the final only, to be discussed) – Freight mobility in an urban region by vehicle-kilometres
- o_fd_vkm_od – Vehicle kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band
- p_fd_load_factor – Average load rate for freight transport in EUR per vkm (no differentiation by country)
- p_fd_load_capacity – Average load capacity for freight transport in EUR per vkm (no differentiation by country)

Passenger Demand

- i_pd_coef_occupancy_rate – Occupancy rate by country, purpose and mode
- o_pd_vkm_od – Aggregated vkm by origin/destination, region and mode (returning trip vkm are not included)

- o_pd_airic_pkm_od – Aggregated passenger kilometres by origin/destination from European regions to RoW regions (returning trip pkm are not included)
- o_pd_airic_trips_od – Aggregated passenger trips by origin/destination from European regions to RoW regions (returning trips are not included)
- o_pd_urban_vkm_ctry – Total urban vehicle kilometres by country, urban mode, simple age group and gender

Output to the Database:

- o_vs_cstavggen_fix_vkm – Average generalised fixed cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_cstavggen_var_vkm – Average generalised variable cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_cstavggen_fix_tkm – Average generalised fixed cost in EUR per tonne kilometre by country, mode and fuel type
- o_vs_cstavggen_var_tkm – Average generalised variable cost in EUR per tonne kilometre by country, mode and fuel type
- o_vs_cstavggen_fix_pkm – Average generalised fixed cost in EUR per passenger kilometre by country, mode and fuel type
- o_vs_cstavggen_var_pkm – Average generalised variable cost in EUR per passenger kilometre by country, mode and fuel type
- o_vs_cstavgen_cost – Average generalised cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_fu_fuel_resource_l – Fuel resource cost in EUR per litre by country, mode and the concerned fuel type
- o_vs_fu_fuel_exduty – Fuel excise duty in EUR per litre by country, mode and fuel type
- o_vs_fu_fuel_cost_l – Fuel costs in EUR per litre of fuel by country, mode and the concerned fuel type
- o_vs_fu_fuel_cost_g – Fuel costs in EUR per gram of fuel by country, mode and the concerned fuel type
- o_vs_fu_fuel_cost_toe – Fuel costs in EUR per tonne of oil equivalent of fuel by country, mode and the concerned fuel type
- o_vs_fu_CO2_tax – CO_2 tax component in total fuel cost in EUR per 1000 l by country, mode and fuel type

- o_vs_tax_revenues – Generated tax revenues in EUR at country level
- o_vs_veh_stock – Detailed vehicle stock in vehicles by country, mode, fuel and vehicle type
- o_vs_veh_stockage – Vehicle stock in 1000 vehicles by country, mode, fuel type, vehicle type and vehicle technology (age cohort)
- o_vs_veh_stock_n2 – Detailed Vehicle stock in vehicles by region (NUTS-2 level), mode, fuel and vehicle type
- o_vs_vkm – Detailed generated vkm by country, vehicle type, mode and fuel type
- o_vs_vkm_n2 – Detailed generated vkm by region (NUTS-2 level), vehicle type, mode and fuel type
- o_vs_vkm_iww – Generated vkm IWW by country, mode, fuel type, IWW mode of appearance and IWW distance band
- o_vs_purch – Total new vehicle purchase cost in EUR distinguished by modes at country (NUTS-0) level

Output to other HIGH-TOOL core modules:

Energy & Resources

- o_vs_tax_revenues – Generated tax revenues in EUR at country level
- o_vs_purch – Total new vehicle purchase cost in EUR distinguished by modes at country (NUTS-0) level
- o_vs_cstavggen_fix_vkm – Average generalised fixed cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_cstavggen_var_vkm – Average generalised variable cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_veh_stock_n2 – Detailed Vehicle stock in vehicles by region (NUTS-2 level), mode, fuel and vehicle type
- o_vs_vkm_n2 – Detailed generated vkm by region (NUTS-2 level), vehicle type, mode and fuel type

Environment

- o_vs_veh_stock – Detailed vehicle stock in vehicles by country, mode, fuel and vehicle type
- o_vs_veh_stock_age – Vehicle stock in 1000 vehicles by country, mode, fuel type, vehicle type and vehicle technology (age cohort)

- o_vs_vkm – Detailed generated vkm by country, vehicle type, mode and fuel type
- o_vs_vkm_iww – Generated vkm IWW by country, mode, fuel type, IWW mode of appearance and IWW distance band

Freight Demand

- o_vs_cstavggen_fix_tkm – Average generalised fixed cost in EUR per tonne kilometre by country, mode and fuel type
- o_vs_cstavggen_var_vkm – Average generalised variable cost in EUR per tonne kilometre by country, mode and fuel type

Passenger Demand

- o_vs_veh_stock – Detailed vehicle stock in vehicles by country, mode, fuel and vehicle type
- o_vs_cstavggen_fix_vkm – Average generalised fixed cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_cstavggen_var_vkm – Average generalised variable cost in EUR per vehicle kilometre by country, mode and fuel type
- o_vs_cstavggen_fix_pkm – Average generalised fixed cost in EUR per passenger kilometre by country, mode and fuel type
- o_vs_cstavggen_var_pkm – Average generalised variable cost in EUR per passenger kilometre by country, mode and fuel type

3.2.6 Environment

The Environment module consists of three components. The component 'Technology' and the component 'Emission Factors' produce input for the component 'Emissions'. The core of the 'Emission' component is the calculation of emission indicators differentiated per vehicle, propulsion technology and energy consumption under consideration of the transport demand figures with vehicle stock attributes. The COPERT[8] method is used for the module to calculate the emissions.

There are no feedback loops seen with other modules. Concerning the information flow to and from the Environment module the following data items are exchanged.

[8] COPERT is based on average speed while the VERSIT model is based on traffic situations (road types, speed limits, degrees of congestion). COPERT is more suitable then to be used on our high level tool while VERSIT is more suitable for network based model with more detailed network information. VERSIT is a discrete model to simulate the traffic emissions of CO_2, NO_x and PM on the basis of the instantaneous velocity and acceleration of a vehicle.

Exogenous **input** from Database:

- i_ev_CO2_content – CO_2 content of fuel in tonnes CO_2 per 1000 l by country, mode and vehicle fuel
- i_ev_emfactor – Fuel consumption and emission factors in grams of pollutant per vkm by mode, vehicle type, vehicle fuel and emission type
- i_ev_emindex – Emission indexes in gram per kilogram of emission by vehicle type
- p_ev_int_railpax – Passenger rail fuel intensity
- p_ev_int_railfreight – Freight rail fuel intensity
- p_ev_int_air – Air transport fuel intensity
- p_ev_int_mar – Maritime transport fuel intensity
- p_ev_emindex_non_elef – Carbon content of non-electricity based fuel
- p_ev_emindex_elef – Carbon content of electricity
- p_ev_air_spec_fden – Air transport fuel density
- p_ev_air_spec_speed – Air transport average speed
- p_ev_mar_spec_rate – Maritime transport average freight yearly growth
- p_ev_mar_spec_avg_dwt – Maritime transport average dead weight tonnage

Endogenous **input** from HIGH-TOOL core modules:

Vehicle Stock

- o_vs_veh_stock – Detailed vehicle stock in vehicles by country, mode, fuel and vehicle type
- o_vs_veh_stock_age – Vehicle stock in 1000 vehicles by country, mode, fuel type, vehicle type and vehicle technology (age cohort)
- o_vs_vkm – Detailed generated vkm by country, vehicle type, mode and fuel type
- o_vs_vkm_iww – Generated vkm IWW by country, mode, fuel type, IWW mode of appearance and IWW distance band

Freight Demand

- o_fd_vkm_od – Vehicle kilometres by origin/destination at NUTS-2 level per mode, commodity and distance band

Passenger Demand

- o_pd_vkm_od – Aggregated vkm by origin/destination, region and mode (returning trip vkm are not included)

- o_pd_urban_vkm_ctry – Total urban vehicle kilometres by country, urban mode, simple age group and gender
- o_pd_airic_pkm_od – Aggregated passenger kilometres by origin/destination from European regions to RoW regions (returning trip pkm are not included)

Output to the Database:

- o_ev_t_co2 – Tonnes of CO_2 emitted by country, mode, fuel und vehicle type
- o_ev_t_fuel – Tonnes of fuel consumed by country, mode, concerned fuel and vehicle type
- o_ev_t_nox – Tonnes of NO_X emitted by country, mode, fuel and vehicle type
- o_ev_t_pm – Tonnes of Particulate Matters emitted
- o_ev_t_so2 – Tonnes of SO_2 emitted by country, mode, fuel and vehicle type

Output to other HIGH-TOOL core modules:

Besides the data interchange with the Database module there is no output delivered to other HIGH-TOOL core modules.

3.2.7 Safety

The target of this module is to assess the impact of safety policy measures. Inputs are historic mobility (from data) and predicted mobility (from the HIGH-TOOL demand modules) and user input changes to safety risk and safety risk causal factors. Risk is defined as the number of "occurrences" (fatalities, injuries) per unit of mobility (kilometres driven). The calculation sequence is split into four components. The component 'Mobility & Crash Data' compiles the historic mobility and safety data (i.e. crash data) generating risk trend lines. This information is used by the component 'Base Risk'. Under consideration of the mobility predictions from the Passenger and Freight Demand modules a basic risk calculation is executed reflecting a business as usual (BAU) situation.

Subsequently the component 'Impact Risk' allows adaptation of the basic risk scenario according to the anticipated effect of modelled safety measures. This effect is derived from changes to accident causal factors (which are the policy inputs) and the elasticities and equations relating these to changes in risk (component 'Causal Variables'). Finally the 'Impact Risk' component executes safety predictions based on the changes defined by the user; thus, the impact risk scenario is generated. While for road, fatalities, serious and slight injuries are predicted, for the other modes the model focuses on fatalities. For all modes the social costs are calculated.

No feedback loops to other modules are expected. Concerning the information flow to and from the Safety module the following data items are exchanged.

Exogenous **input** from Database (stratification still under investigation):

- i_sa_fat_bike – Historic bike fatality data per year for 2001–2010 by country, age group and gender cohort
- i_sa_serinj_bike – Historic bike serious injury data per year for 2001–2010 by country, age group and gender cohort
- i_sa_slinj_bike – Historic bike slight injury data per year for 2001–2010 by country, age group and gender cohort
- i_sa_fat_car – Historic car fatality data per year for 2001–2010 by country, age group and gender cohort
- i_sa_serinj_car – Historic car serious injury data per year for 2001–2010 by country, age group and gender cohort
- i_sa_slinj_car – Historic car slight injury data per year for 2001–2010 by country, age group and gender cohort
- i_sa_fat_p2w – Historic P2W fatality data per year for 2001–2010 by country, age group and gender cohort
- i_sa_serinj_p2w – Historic P2W serious injury data per year for 2001–2010 by country, age group and gender cohort
- i_sa_slinj_p2w – Historic P2W slight injury data per year for 2001–2010 by country, age group and gender cohort
- i_sa_fat_ped – Historic pedestrian fatality data per year for 2001–2010 by country and mode (urban, involved)
- i_sa_serinj_ped – Historic pedestrian serious injury data per year for 2001–2010 by country and mode (urban, involved)
- i_sa_slinj_ped – Historic pedestrian slight injury data per year for 2001–2010 by country and mode (urban, involved)
- i_sa_fat_pt – Historic public transport fatality data per year for 2001–2010 by country
- i_sa_serinj_pt – Historic public transport serious injury data per year for 2001–2010 by country
- i_sa_slinj_pt – Historic public transport slight injury data per year for 2001–2010 by country
- i_sa_fat_truck – Historic truck fatality data per year for 2001–2010 by country

- i_sa_serinj_truck – Historic truck serious injury data per year for 2001–2010 by country
- i_sa_slinj_truck – Historic truck slight injury data per year for 2001–2010 by country
- i_sa_fat_air – Current annual average number of fatalities for air for EU28 + CH + NO
- i_sa_fat_rail – Current annual average number of fatalities for rail by country
- i_sa_fat_risk_iww – Policy level for fatality risk inland waterways (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_fat_risk_sss – Policy level for fatality risk short sea shipping (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_pkm_bike – Bike pkm 2010 by country, age group and gender cohort
- i_sa_pkm_car – Historic car pkm per year for 2001–2010 by country, age group and gender cohort
- i_sa_pkm_p2w – Historic P2W pkm per year for 2001–2010 by country, age group and gender cohort
- i_sa_pkm_pt – Historic public transport person kilometres per year for 2001–2010 by country
- i_sa_engine_failure_air – Policy level for air engine failure (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_crew_error_air – Policy level for air crew errors (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_tech_failure_air – Policy level for air technical failure excl. engine (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_runway_collision_air – Policy level for air runway collisions (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_fire_air – Policy level for air fire on board (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_mid_air_collision_air – Policy level for air mid-air collisions (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_load_error_air – Policy level for air loading errors (in percentage change) compared to 2010 for EU28 + CH + NO
- i_sa_speed_bike – Policy level for bike speed (in percentage change) compared to 2010 by country
- i_sa_dui_bike – Policy level for bike driving under influence of alcohol/drugs (in percentage change) compared to 2010 by country, age group and gender cohort

- i_sa_distraction_bike – Policy level for distraction of cyclists (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_fatigue_bike – Policy level for fatigue of cyclists (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_helmet_bike – Policy level for use of helmets by cyclists (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_infra_fault_bike – Policy level for bike accidents caused by infrastructural faults (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_veh_defect_bike – Policy level for bike vehicle defects (in percentage change) compared to 2010 by country
- i_sa_time_med_care_bike – Policy level for time to medical care after bike accident (in percentage change) compared to 2010 by country. In the expert mode you may change its values by age group and gender cohort
- i_sa_speed_car – Policy level for car speed (in percentage change) compared to 2010 by country
- i_sa_dui_car – Policy level for car driving under influence of alcohol/drugs (in percentage change) compared to 2010 by country, by age group and gender cohort
- i_sa_distraction_car – Policy level for distraction of car drivers (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_fatigue_car – Policy level for fatigue of car drivers (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_restraint_car – Policy level for car driving under influence of alcohol/drugs (in percentage change) compared to 2010 by country, by age group and gender cohort
- i_sa_infra_fault_car – Policy level for car accidents caused by infrastructural faults (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_veh_defect_car – Policy level for car vehicle defects (in percentage change) compared to 2010 by country
- i_sa_time_med_care_car – Policy level for time to medical care after car accident (in percentage change) compared to 2010 by country
- i_sa_speed_p2w – Policy level for P2W speed (in percentage change) compared to 2010 by country
- i_sa_dui_p2w – Policy level for P2W driving under influence of alcohol/drugs (in percentage change) compared to 2010 by country, age group and gender cohort

- i_sa_distraction_p2w – Policy level for distraction of P2W drivers (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_fatigue_p2w – Policy level for fatigue of P2W drivers (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_helmet_p2w – Policy level for use of helmets by P2W drivers/passengers (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_infra_fault_p2w – Policy level for P2W accidents caused by infrastructural faults (in percentage change) compared to 2010 by country, age group and gender cohort
- i_sa_veh_defect_p2w – Policy level for P2W vehicle defects (in percentage change) compared to 2010 by country
- i_sa_time_med_care_p2w – Policy level for time to medical care after P2W accident (in percentage change) compared to 2010 by country
- i_sa_speed_pt – Policy level for public transport speed (in percentage change) compared to 2010 by country
- i_sa_dui_pt – Policy level for public transport driving under influence of alcohol/drugs (in percentage change) compared to 2010 by country
- i_sa_distraction_pt – Policy level for distraction of public transport drivers (in percentage change) compared to 2010 by country
- i_sa_fatigue_pt – Policy level for fatigue of public transport drivers (in percentage change) compared to 2010 by country
- i_sa_infra_fault_pt – Policy level for public transport accidents caused by infrastructural faults (in percentage change) compared to 2010 by country
- i_sa_veh_defect_pt – Policy level for public transport vehicle defects (in percentage change) compared to 2010 by country
- i_sa_time_med_care_pt – Policy level for time to medical care after public transport accident (in percentage change) compared to 2010 by country
- i_sa_osign_staff_error_rail – Policy level for rail operating and signalling staff error (in percentage change) compared to 2010 by country
- i_sa_crew_error_rail – Policy level for rail crew errors (in percentage change) compared to 2010 by country
- i_sa_track_staff_error_rail – Policy level for rail track staff error (in percentage change) compared to 2010 by country
- i_sa_stock_fault_rail – Policy level for rail rolling stock fault (in percentage change) compared to 2010 by country

- i_sa_infra_fault_rail – Policy level for rail accidents caused by infrastructural faults (in percentage change) compared to 2010 by country
- i_sa_lc_veh_acc_rail – Policy level for rail level-crossing accident vehicle (in percentage change) compared to 2010 by country
- i_sa_lc_vuln_acc_rail – Policy level for rail level-crossing accident vulnerable user (in percentage change) compared to 2010 by country
- i_sa_trespassing_rail – Policy level for rail trespassing accident (in percentage change) compared to 2010 by country
- i_sa_platform_acc_rail – Policy level for rail platform accident (in percentage change) compared to 2010 by country
- i_sa_falling_from_train_rail – Policy level for rail falling from train (in percentage change) compared to 2010 by country
- i_sa_speed_truck – Policy level for truck speed (in percentage change) compared to 2010 by country
- i_sa_dui_truck – Policy level for truck driving under influence of alcohol/drugs (in percentage change) compared to 2010 by country
- i_sa_distraction_truck – Policy level for distraction of truck drivers (in percentage change) compared to 2010 by country
- i_sa_fatigue_truck – Policy level for fatigue of truck drivers (in percentage change) compared to 2010 by country
- i_sa_restraint_truck – Policy level for truck use of restraint devices (in percentage change) compared to 2010 by country
- i_sa_blind_spot_truck – Policy level for truck blind spots (in percentage change) compared to 2010 by country
- i_sa_infra_fault_truck – Policy level for truck accidents caused by infrastructural faults (in percentage change) compared to 2010 by country
- i_sa_veh_defect_truck – Policy level for truck vehicle defects (in percentage change) compared to 2010 by country
- i_sa_time_med_care_truck – Policy level for time to medical care after truck accident (in percentage change) compared to 2010 by country
- i_sa_load_error_truck – Policy level for truck accidents caused by infrastructural faults (in percentage change) compared to 2010 by country
- i_sa_trips_air – Current annual average mobility for air in trips for EU28 + CH + NO

- i_sa_vkm_rail – Current annual average mobility for rail in vehicle kilometres by country
- i_sa_vkm_truck – Historic truck vehicle kilometres per year for 2001–2010 by country
- i_sa_vkm_urban – Historic urban vehicle kilometres per year for 2001–2010 by country and mode (urban, involved)

Endogenous **input** from HIGH-TOOL core modules:

Freight Demand

- o_fd_vkm_transit – Freight mobility in a country including transit in vehicle kilometres by country, distance band and mode

Passenger Demand

- o_pd_pkm_transit_safety – Aggregated total passenger kilometres including transit by country, mode, simple age groups and gender
- o_pd_vkm_transit– Aggregated total vkm including transit by country and mode
- o_pd_trips_orig_safety – Aggregated trips by origin region, mode, simple age groups and gender cohort
- o_pd_urban_pkm_ctry – Total urban passenger kilometres by country, urban mode, simple age group and gender
- o_pd_urban_vkm_ctry – Total urban vehicle kilometres by country, urban mode, simple age group and gender
- o_pd_airic_trips_od – Aggregated passenger trips by origin/destination from European regions to RoW regions (returning trips are not included)

Output to the Database:

- o_sa_acc_cost_air – Total social accident costs for air in 1000 EUR for EU28 + CH + NO
- o_sa_fat_air_pred – Air fatalities for EU28 + CH + NO
- o_sa_fat_bike_pred – Bike fatalities by country, age and gender cohort
- o_sa_serinj_bike_pred – Bike serious injuries by country, age and gender cohort
- o_sa_slinj_bike_pred – Bike slight injuries by country, age and gender cohort
- o_sa_fat_car_pred – Car fatalities by country, age and gender cohort
- o_sa_serinj_car_pred – Car serious injuries by country, age and gender cohort
- o_sa_slinj_car_pred – Car slight injuries by country, age and gender cohort

- o_sa_acc_cost_iww – Total social accident costs for inland waterway in 1000 EUR for EU28 + CH + NO
- o_sa_fat_iww_pred – Inland waterway fatalities for EU28 + CH + NO
- o_sa_fat_p2w_pred – P2W fatalities by country, age and gender cohort
- o_sa_serinj_p2w_pred – P2W serious injuries by country, age and gender cohort
- o_sa_slinj_p2w_pred – P2W slight injuries by country, age and gender cohort
- o_sa_fat_ped_pred – Pedestrian fatalities by country and mode (urban, involved)
- o_sa_serinj_ped_pred – Pedestrian serious injuries by country and mode (urban, involved)
- o_sa_slinj_ped_pred – Predicted pedestrian slight injuries per year for 2010–2050
- o_sa_fat_pt_pred – Public transport fatalities by country
- o_sa_serinj_pt_pred – Public transport serious injuries by country
- o_sa_slinj_pt_pred – Public transport slight injuries by country
- o_sa_acc_cost_rail – Total social accident costs for rail in 1000 EUR by country
- o_sa_fat_rail_pred – Rail fatalities by country
- o_sa_acc_cost_sss – Total social accident costs for short-sea shipping in 1000 EUR for EU28 + CH + NO
- o_sa_fat_sss_pred – Short-sea shipping fatalities for EU28 + CH + NO
- o_sa_fat_truck_pred – Truck fatalities by country
- o_sa_serinj_truck_pred – Truck serious injuries by country
- o_sa_slinj_truck_pred – Truck slight injuries by country
- o_sa_costs_road – Total social accident costs for road transport in 1000 EUR by country and urban mode

Output to other HIGH-TOOL core modules:

Besides the data interchange with the Database module there is no output delivered to other HIGH-TOOL core modules.

3.2.8 Database

The Database module is the major information exchange entity for all in- and output data the HIGH-TOOL modules need to perform the computation. WP3 is specifically dedicated to the Database, and Deliverable D3.1[9] (Kiel et al., 2015) outlines in detail the data structure, dimensions and characteristics complemented by metadata. The Database underlies an intensive exchange of data with all modules.

Exogenous **input** for Database (see the dedicated sections of the HIGH-TOOL core modules above):

- Extract of the ETISplus database
- Eurostat and other public databases
- EU Reference Scenario 2013
- Scenario specifications by the user (including data uploads).

Endogenous **input** from HIGH-TOOL core modules is listed in the dedicated sections above but in general the following data are exchanged:

- Impedance and socio-economic data upload
- Policy request translation (scenario definition).

The specification of a TPM by the users is interpreted as a policy request addressed to HIGH-TOOL. Therefore the TPM specification needs to be translated to run the modules, i.e. the policy request is translated using policy levers (see chapter 4.1.1). For transparency reasons the policy request will also become part of the report attached to the assessment results.

All core modules deliver their intermediate and final data sets to the Database module. The Database provides **output** to other HIGH-TOOL core modules as listed in the previous sections above.

3.2.9 Assessment

The assessment report is produced by following three components: external cost computation as the welfare (changes in household income – monetised externalities, and employment) caused by transport, inter-modal competition analyses, and the technical report generator to transform the generated results into a user friendly document. The assessment report itself is an electronic document based on Excel which can be downloaded by the user.

[9] D3.1 will be updated to D3.2.

All data produced by the core modules and stored in the Database are available for generation of the assessment reports. There is one feedback loop with the user interface and the Database. Concerning the information flow to and from the Assessment module the following data items are exchanged.

Input from Database:

All data according to the requested assessment report type will be withdrawn from the Database module. The indicators available are shown in Table 6 per module.

Table 6: Assessment variables of the HIGH-TOOL model

Assessment variables of the HIGH-TOOL prototype
General Features
» Geographical scope: EU28 + NO + CH on NUTS-0 and/or NUTS-2, RoW by country aggregation
» Period: 2010–2050 in 5-year steps respectively yearly steps (as defined by the user)
Demography
o_de_labour, o_de_pop
Economy & Resources
o_er_gdp, o_er_gdp_capita, o_er_cons_capita, o_er_trade, o_er_labour_new, o_er_wage_new, o_er_return_new, o_er_gdp _new, o_er_income, o_er_PD_new, o_er_P_new, o_er_trade_new, o_er_employment, o_er_income_capita, o_er_co2, o_er_sox, o_er_nox, o_er_PM, o_er_biomass, o_er_wood, o_er_metalores, o_er_water, o_er_minerals, o_er_fossilfuel, o_er_gva, o_er_hh_consumption, o_er_int_input, o_er_prod_tax, o_er_cap_returns, o_er_cap_stock, o_er_output, o_er_tot_emissions, o_er_wages, o_er_price_index, o_er_indirect_utility
Vehicle Stock
o_vs_cstavggen_fix_vkm, o_vs_cstavggen_var_vkm, o_vs_cstavggen_fix_tkm, o_vs_cstavggen_var_tkm, o_vs_cstavggen_fix_pkm, o_vs_cstavggen_var_pkm, o_vs_fu_fuel_resource_l, o_vs_fu_fuel_exduty, o_vs_fu_fuel_cost_l, o_vs_fu_fuel_cost_g, o_vs_fu_fuel_cost_toe, o_vs_fu_CO2_tax, o_vs_tax_revenues, o_vs_veh_stock, o_vs_veh_stock_age, o_vs_stock_n2, o_vs_fu_energy_tax, o_vs_vkm, o_vs_vkm_n2, o_vs_vkm_iww, o_vs_purch
Environment
o_ev _t_co2, o_ev_t_fuel, o_ev_t_nox, o_ev_t_pm, o_ev_t_so2
Freight Demand
o_fd_tkm_od, o_fd_vkm_od, o_fd_t_od, o_fd_total_cost_od, o_fd_vkm_transit, o_fd_tkm_transit
Passenger Demand
o_pd_od_fix_cost, o_pd_od_time_cost, o_pd_od_toll_cost, o_pd_od_var_cost, o_pd_orig_fix_cost, o_pd_orig_time_cost, o_pd_orig_toll_cost, o_pd_orig_var_cost, o_pd_transit_fix_cost, o_pd_transit_time_cost, o_pd_transit_toll_cost, o_pd_transit_var_cost, o_pd_pkm_od, o_pd_pkm_orig, o_pd_pkm_transit, o_pd_vkm_od, o_pd_vkm_orig, o_pd_vkm_transit, o_pd_trips_od, o_pd_trips_orig, o_pd_pkm_orig_safety, o_pd_pkm_transit_safety, o_pd_airic_trips_od, o_pd_airic_pkm_od, o_pd_airic_costae_od, o_pd_airic_costnet_od, o_pd_urban_pkm_ctry, o_pd_urban_trips_ctry, o_pd_urban_vkm_ctry, o_pd_vkmdistancebandctry, o_pd_pkmdistancebandctry
Safety
o_sa_acc_cost_air, o_sa_fat_air_pred, o_sa_fat_bike_pred, o_sa_serinj_bike_pred, o_sa_slinj_bike_pred, o_sa_fat_car_pred, o_sa_serinj_car_pred, o_sa_slinj_car_pred, o_sa_acc_cost_iww, o_sa_fat_iww_pred, o_sa_fat_p2w_pred, o_sa_serinj_p2w_pred, o_sa_slinj_p2w_pred, o_sa_fat_ped_pred, o_sa_serinj_ped_pred, o_sa_slinj_ped_pred, o_sa_fat_pt_pred, o_sa_serinj_pt_pred, o_sa_slinj_pt_pred, o_sa_acc_cost_rail, o_sa_fat_rail_pred, o_sa_acc_cost_sss, o_sa_fat_sss_pred, o_sa_fat_truck_pred, o_sa_serinj_truck_pred, o_sa_slinj_truck_pred, o_sa_costs_road

Input from HIGH-TOOL modules:

- Scenario definition provided by the interactive user interface
- Assessment report request by the user.

Output to the Database respectively the main hard disc of the computer and other HIGH-TOOL modules:

- Assessment report (including the policy request addressed to the system) as Excel/Word file.

3.2.10 User Interface

The interface has four components which support the user in defining policy requests with an adequate assessment report type and to up-/download certain data sets such as impedances or socio-economic data and to document the policy request started. The fourth component will translate the users' policy request into module conforming language after the interactive entry of the users' scenario specification. For more details the reader is referred to Deliverable D6.1[10] (Biosca et al., 2015) and its updated versions.

A feedback loop exists between the Assessment and the Database. Concerning the information flow to and from the User Interface module the following data items are exchanged.

Input from Database:

- Data download
- Assessment report (including the policy request addressed to the system) download.

The reports provided will allow comparison of the results from the policy scenario with the ones of the reference scenario. While the reference scenario needs to reflect the defined EU Reference Scenario 2013 it might be necessary for the experienced user to allow for changes within a user defined scenario. Thus the option to work with other socio-economic and transport related data had been considered.

[10] Deliverable D6.1 will be updated to Deliverable D6.2.

Output to the Database:

- Impedance and socio-economic data upload
- Policy request translation (scenario definition including changes in causal variables resulting from modelled safety measure(s)).

A detailed description of the user interface is provided by D6.1 (Biosca et al., 2015).

3.2.11 Summary of the Input/Output Matrix

Figure 5 displays the data interdependencies within the HIGH-TOOL model as described in the previous chapters. The matrix allows an overview of where and what type of information is exchanged between the modules. It reflects the dataflow when considering that the data exchange passes through the database.

Module delivers data / information to	Demography	Economy & Resources	Vehicle Stock	Environment
Demography		For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles o_de_labour o_de_pop	For EU28+NO+CH on NUTS-0 o_de_pop	No input required
Economy & Resources	No input required		For EU28+NO+CH on NUTS-2 o_er_gdp_capita	No input required
Vehicle Stock	No input required	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0 o_vs_tax_revenues o_vs_purch o_vs_cstavggen_fix_vkm, o_vs_cstavggen_var_vkm, o_vs_veh_stock_n2, o_vs_vkm_n2		For EU28+NO+CH and Rest of Europe NUTS-0 o_vs_veh_stock o_vs_veh_stock_age o_vs_vkm o_vs_vkm_iww
Environment	No input required	No input required	No input required	
Freight Demand	No input required	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles o_fd_tkm_od, o_fd_vkm_od, o_fd_t_od, o_fd_total_costs_od, i_fd_toll_cost	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles o_fd_vkm_od p_fd_load_factor p_fd_load_capacity	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0 o_fd_vkm_od

Figure 5: Input/Output matrix of the HIGH-TOOL model

Module delivers data / information to	Freight Demand	Passenger Demand	Safety	Database
Demography	No input required	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles o_de_labour o_de_pop	No input required	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles o_de_labour o_de_pop
Economy & Resources	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles o_er_trade_new	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles o_er_gdp o_er_empl o_er_income o_er_gva	No input required	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles o_er_gdp, o_er_gdp_capita, o_er_cons_capita, o_er_labour_new, o_er_wage_new, o_er_return_new, o_er_income, o_er_PD_new, o_er_P_new, o_er_trade_new, o_er_employment, o_er_income_capita, o_er_co2, o_er_sox, o_er_nox, o_er_PM, o_er_biomass, o_er_wood, o_er_metal_ores, o_er_water, o_er_minerals, o_er_fossilfuel, o_er_gva, o_er_hh_consumption, o_er_int_input, o_er_prod_tax, o_er_cap_returns, o_er_cap_stock, o_er_output, o_er_tot_emissions, o_er_wages, o_er_price_index, o_er_indirect_utility, o_er_value
Vehicle Stock	For EU28+NO+CH on NUTS-0, Rest of Europe NUTS-0 o_vs_cstavggen_fix_tkm o_vs_cstavggen_var_vkm	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0 o_vs_veh_stock For EU28+NO+CH on NUTS-0, Rest of Europe NUTS-0 o_vs_cstavggen_fix_vkm o_vs_cstavggen_var_vkm o_vs_cstavggen_fix_pkm (non road modes) o_vs_cstavggen_var_pkm (non road modes)	No input required	For EU28+NO+CH on NUTS 2, Rest of Europe NUTS 0 o_vs_cstavggen_fix_vkm o_vs_cstavggen_var_vkm o_vs_cstavggen_fix_tkm o_vs_cstavggen_var_tkm o_vs_cstavggen_fix_pkm o_vs_cstavggen_var_pkm o_vs_cstavdgen_cost o_vs_fu_fuel_resource_l o_vs_fu_fuel_exduty, o_vs_fu_fuel_cost_l o_vs_fu_fuel_cost_g, o_vs_fu_fuel_cost_toe o_vs_fu_CO2_tax, o_vs_tax_revenues o_vs_veh_stock, o_vs_veh_stock_age o_vs_stock_n2, o_vs_vkm, o_vs_vkm_n2, o_vs_vkm_iww o_vs_purch
Environment	No input required	No input required	No input required	For EU28+NO+CH on NUTS 2 o_ev_t_co2, o_ev_t_fuel o_ev_t_nox, o_ev_t_pm o_ev_t_so2
Freight Demand		No input required	For EU28+NO+CH on NUTS-0 o_fd_vkm_transit	For EU28+NO+CH on NUTS 2, Rest of Europe NUTS 0, Rest of World bundles o_fd_tkm_od, o_fd_vkm_od, o_fd_t_od, o_fd_total_cost_od o_fd_air_demand_od_t, o_fd_air_demand_od_tkm o_fd_air_demand_od_vkm, o_fd_air_demand_t_od For EU28+NO+CH on NUTS 0 o_fd_vkm_transit, o_fd_tkm_transit

Figure 6: Input/Output matrix of the HIGH-TOOL model

Module delivers data / information to	Demography	Economy & Resources	Vehicle Stock	Environment
Passenger Demand	No input required	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0 o_pd_pkm_od o_pd_vkm_od o_pd_trips_od o_pd_od_fix_cost o_pd_od_time_cost o_pd_od_toll_cost o_pd_od_var_cost For O/D relations from (to) EU28+NO+CH on NUTS-2 to (from) Rest of World bundles o_pd_airic_pkm_od o_pd_airic_costae_od o_pd_airic_costnet_od o_pd_airic_trips_od	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0 o_pd_vkm_od (air not covered) i_pd_coef_occupancy_rate For O/D relations from (to) EU28+NO+CH on NUTS-2 to (from) Rest of World bundles o_pd_airic_pkm_od o_pd_airic_trips_od For EU28+NO+CH on NUTS-0 o_pd_urban_vkm_ctry	For EU28+NO+CH on NUTS-0, Rest of Europe NUTS-0 o_pd_vkm_od (air not covered) For O/D relations from (to) EU28+NO+CH on NUTS-2 to (from) Rest of World bundles o_pd_airic_pkm_od For EU28+NO+CH on NUTS-0 o_pd_urban_vkm_ctry
Safety	No input required	No input required	No input required	No input required
Database	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles i_de_labour_hist i_de_labour_perc i_de_death i_de_pop_disag i_de_pop_eurostat i_de_life_men i_de_life_women i_de_net_migration i_de_tot_fert_rate i_de_urban i_de_eu_ref	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles p_er_g_gva, p_er_alpha_i, p_er_g_gdp p_er_alpha_i_tot, p_er_io, p_er_p, p_er_eta p_er_beta, p_er_d, p_er_o, p_er_epsilon, p_er_tc p_er_delta, p_er_phi, p_er_delta_ks_tot p_er_delta_ls, p_er_delta_ls_tot p_er_gdp_scaler, p_er_pd i_er_i_tot, i_er_xd_tot, i_er_k_tot, i_er_xd, i_er_gva i_er_delta_inf_inv, i_er_delta_rtd, i_er_gdp, i_er_delta_inv, i_er_delta_acc, i_er_sectorshare	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0 i_vs_cap_rpcs_mkt, i_vs_rpcs_vat i_vs_cap_tech, i_vs_cap_subsidy i_vs_scrap_subs, i_vs_cstiwv i_vs_fu_ct, i_vs_fu_fuel_resource_toe i_vs_fu_fuel_vat, i_vs_fu_exduty_eur_1000l i_vs_fu_exduty_eur_1000kg, i_vs_fu_exduty_eur_gj i_vs_fu_exduty_eur_kwh, i_vs_nf_air_neoe_pas i_vs_nf_air_neoe_fre, i_vs_nf_mar_chcost i_vs_nf_mar_oi_vcost, i_vs_nf_mar_opcost i_vs_nf_mar_repmaintc, i_vs_nf_rail_crec i_vs_nf_rail_damc, i_vs_nf_rail_othc i_vs_nf_rail_repmaintc, i_vs_nf_cstinsu i_vs_nf_road_repmaintc, i_vs_nf_rof_cst_labo i_vs_nf_rof_cst_othr, i_vs_nf_rof_cst_time i_vs_nf_taxfuel, i_vs_nf_taxinsu, i_vs_nf_taxown i_vs_nf_taxregs, i_vs_veh_stock i_vs_veh_stock_age p_vs_surv_scrap, p_vs_surv_depriv, p_vs_logit_elast, p_vs_fu_emfactor, p_vs_fu_nrg_content, p_vs_fu_toe p_vs_rail_spec_whour	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0 i_ev_CO2_content i_ev_emfactor i_ev_emindex p_ev_int_railpax p_ev_int_railfreight p_ev_int_air p_ev_int_mar p_ev_emindex_non_elef p_ev_emindex_elef p_ev_air_spec_fden p_ev_air_spec_speed p_ev_mar_spec_rate p_ev_mar_spec_avg_dwt

Figure 5: Input/Output matrix of the HIGH-TOOL model (cont.)

Module delivers data / information to	Freight Demand	Passenger Demand	Safety	Database
Passenger Demand	No input required		For EU28+NO+CH on NUTS-2 o_pd_pkm_transit_safety o_pd_vkm_transit o_pd_trips_orig For EU28+NO+CH on NUTS-0 o_pd_urban_pkm_ctry o_pd_urban_vkm_ctry For O/D relations from (to) Rest of World bundles o_pd_airic_trips_od	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0 o_pd_od_fix_cost, o_pd_od_time_cost, o_pd_od_toll_cost, o_pd_od_var_cost o_pd_orig_fix_cost, o_pd_orig_time_cost, o_pd_orig_toll_cost, o_pd_orig_var_cost o_pd_transit_fix_cost, o_pd_transit_time_cost, o_pd_transit_toll_cost, o_pd_transit_var_cost o_pd_pkm_od, o_pd_pkm_orig, o_pd_pkm_transit, o_pd_vkm_od, o_pd_vkm_orig, o_pd_vkm_transit o_pd_trips_od, o_pd_trips_orig, o_pd_trips_orig_safety o_pd_pkm_orig_safety, o_pd_pkm_transit_safety o_pd_imp_aenet_dist, o_pd_imp_aenet_time o_pd_imp_hnet_dist, o_pd_imp_hnet_time For O/D relations from (to) EU28+NO+CH on NUTS-2 to (from) Rest of World bundles o_pd_airic_trips_od, o_pd_airic_pkm_od, o_pd_airic_costae_od, o_pd_airic_costnet_od For EU28+NO+CH on NUTS-0 o_pd_urban_pkm_ctry, o_pd_urban_trips_ctry, o_pd_urban_vkm_ctry o_pd_vkmdistancebandctry, o_pd_pkmdistancebandctry
Safety	No input required	No input required		For EU28+NO+CH on NUTS 0 o_sa_acc_cost_air, o_sa_fat_air_pred o_sa_fat_bike_pred, o_sa_serinj_bike_pred, o_sa_slinj_bike_pred o_sa_fat_car_pred, o_sa_serinj_car_pred, o_sa_slinj_car_pred o_sa_acc_cost_iww, o_sa_fat_iww_pred o_sa_fat_p2w_pred, o_sa_serinj_p2w_pred, o_sa_slinj_p2w_pred o_sa_fat_ped_pred, o_sa_serinj_ped_pred, o_sa_slinj_ped_pred o_sa_fat_pt_pred, o_sa_serinj_pt_pred, o_sa_slinj_pt_pred o_sa_acc_cost_rail, o_sa_fat_rail_pred o_sa_acc_cost_sss, o_sa_fat_sss_pred o_sa_fat_truck_pred, o_sa_serinj_truck_pred, o_sa_slinj_truck_pred o_sa_costs_road
Database	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles i_fd_region_share, i_fd_imp_dist i_fd_toll_cost, i_fd_trade_air i_fd_route_choice, p_fd_fixed_cost p_fd_var_cost, p_fd_fuel_cost p_fd_load_factor, p_fd_load_capacity p_fd_speed, p_fd_load_time p_fd_unload_time, p_fd_wait_time p_fd_utilities, p_fd-air_param p_fd_fixed_cost_calib p_fd_var_cost_calib p_fd_fuel_cost_calib p_fd_load_factor_calib p_fd_load_capacity_calib p_fd_speed_calib p_fd_load_time_calib p_fd_unload_time_calib p_fd_wait_time_calib p_fd_utilities_calib p_fd_air_param_calib p_fd_trade_value p_fd_air_share_full_freight	For EU28+NO+CH on NUTS-2, Rest of Europe NUTS-0, Rest of World bundles i_pd_coef_transitshare, i_pd_coef_occupancy_rate i_pd_imp_net_time, i_pd_imp_ae_time i_pd_imp_net_dist, i_pd_imp_ae_dist i_pd_imp_delta_los, i_pd_imp_ref_dist i_pd_exogenous_hotel, i_pd_exogenous_bed i_pd_exogenous_area, i_pd_exogenous_radius i_pd_ref_dist, i_pd_core_toll_cost i_pd_citydwellershare, i_pd_referencedemand i_pd_referenceflow, i_pd_referencepopulation i_pd_capital, i_pd_capital_lat, i_pd_capital_long i_pd_ae_dist, i_pd_ae_dist_weight, i_pd_ae_time, i_pd_ae_time_weight i_pd_link_dist, i_pd_link_dist_weight, i_pd_link_time, i_pd_link_time_weight i_pd_urban_duaetime, i_pd_urban_dutoll, i_pd_urban_dutraveldist, i_pd_urban_dutraveltime For O/D relations from (to) EU28+NO+CH on NUTS-2 to (from) Rest of World bundles i_pd_aecost, i_pd_aircost, i_pd_aetime i_pd_airmodetime, i_pd_freq, i_pd_airdist i_pd_referenceflow	For EU28+NO+CH on NUTS-0 i_sa_fat_bike, i_sa_serinj_bike, i_sa_slinj_bike i_sa_fat_car, i_sa_serinj_car, i_sa_slinj_car i_sa_fat_p2w, i_sa_serinj_p2w, i_sa_slinj_p2w i_sa_fat_ped, i_sa_serinj_ped, i_sa_slinj_ped i_sa_fat_pt, i_sa_serinj_pt, i_sa_slinj_pt i_sa_fat_truck, i_sa_serinj_truck, i_sa_slinj_truck i_sa_fat_air, i_sa_fat_rail, i_sa_fat_risk_iww, i_sa_fat_risk_sss i_sa_pkm_bike, i_sa_pkm_car, i_sa_pkm_p2w, i_sa_pkm_pt i_sa_engine_failure_air, i_sa_crew_error_air, i_sa_tech_failure_air, i_sa_runway_collision_air, i_sa_fire_air, i_sa_mid_air_collision_air, i_sa_load_error_air, i_sa_speed_bike, i_sa_dui_bike, i_sa_distraction_bike, i_sa_fatigue_bike, i_sa_helmet_bike, i_sa_infra_fault_bike, i_sa_veh_defect_bike, i_sa_time_med_care_bike i_sa_speed_car, i_sa_dui_car, i_sa_distraction_car, i_sa_fatigue_car, i_sa_restraint_car, i_sa_infra_fault_car, i_sa_veh_defect_car, i_sa_time_med_care_car, i_sa_speed_p2w, i_sa_dui_p2w, i_sa_distraction_p2w, i_sa_fatigue_p2w, i_sa_helmet_p2w, i_sa_infra_fault_p2w, i_sa_veh_defect_p2w, i_sa_time_med_care_p2w, i_sa_speed_pt, i_sa_dui_pt, i_sa_distraction_pt, i_sa_fatigue_pt, i_sa_infra_fault_pt, i_sa_veh_defect_pt, i_sa_time_med_care_pt i_sa_cosign_staff_error_rail, i_sa_crew_error_rail, i_sa_track_staff_error_rail, i_sa_stock_fault_rail, i_sa_infra_fault_rail, i_sa_lc_veh_acc_rail, i_sa_lc_vuln_acc_rail, i_sa_trespassing_rail, i_sa_platform_acc_rail, i_sa_falling_from_train_rail, i_sa_speed_truck, i_sa_dui_truck, i_sa_distraction_truck, i_sa_fatigue_truck, i_sa_restraint_truck, i_sa_blind_spot_truck, i_sa_infra_fault_truck, i_sa_veh_defect_truck, i_sa_time_med_care_truck, i_sa_load_error_truck i_sa_trips_air, i_sa_vkm_rail, i_sa_vkm_truck, i_sa_vkm_urban	

Figure 5: Input/Output matrix of the HIGH-TOOL model (cont.)

4 Transport Policy Measures (TPMs)

HIGH-TOOL is designed as strategic tool to assess Transport Policy Measures. To offer the user a wide spectrum of possibilities three options to define Transport Policy Measures are available (see Biosca et al., 2015):

- Single Transport Policy Measure
  Policies have been extracted from publications of the European Commission along the user requirements outlined at the beginning of the HIGH-TOOL project (Vanherle et al., 2014).
- Policy package with combined Transport Policy Measures
  This option allows the used to combine TPMs in a consistent way for simulation of more complex policy packages by merging TPMs.
- User defined Policy Scenarios
  The user is free to develop a customised TPM by selecting policy levers used in HIGH-TOOL.

The following chapters reflect the transport policy measures the HIGH-TOOL model addresses, what type of policy levers are used, and which TPMs are already embedded in the EU Reference Scenario 2013.

4.1 Transport Policy Measures Addressed in HIGH-TOOL

In total four categories of transport policy measures (TPMs) are envisaged. The categories reflect the ones mentioned in the White Paper. There are six transport policy measures dealing with pricing category, five with research and innovation, eight with efficiency standards and flanking measures, and eleven with internal market. In total 30 pre-defined transport policy measures can be investigated which are distributed among four policy categories as displayed in Figure 6.

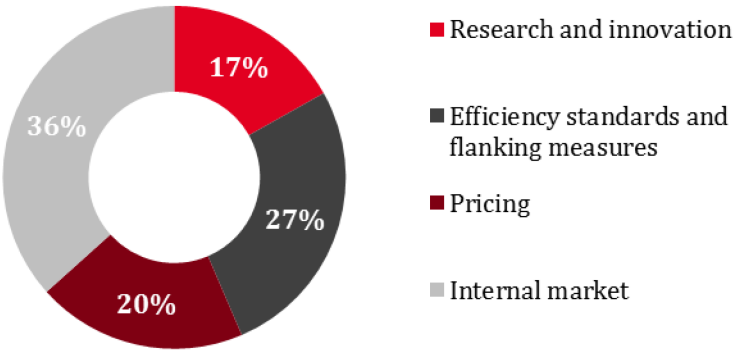

Figure 7: Transport Policy Measures by category

To address the full scope of each transport policy measure different HIGH-TOOL modules need to handle the investigation. Thus three times the Economy & Resources module is directly approached, 14 times the Passenger Demand, 25 times the Freight Demand, 35 times the Vehicle Stock, nine times the Environment and 12 times the Safety module. As direct approach we define a modification of a policy lever which is assigned to a specific HIGH-TOOL module as the policy investigated changes directly the input values. As several feedback loops exist and the modules interact respectively one module produces input to another one, there are also indirect effects.

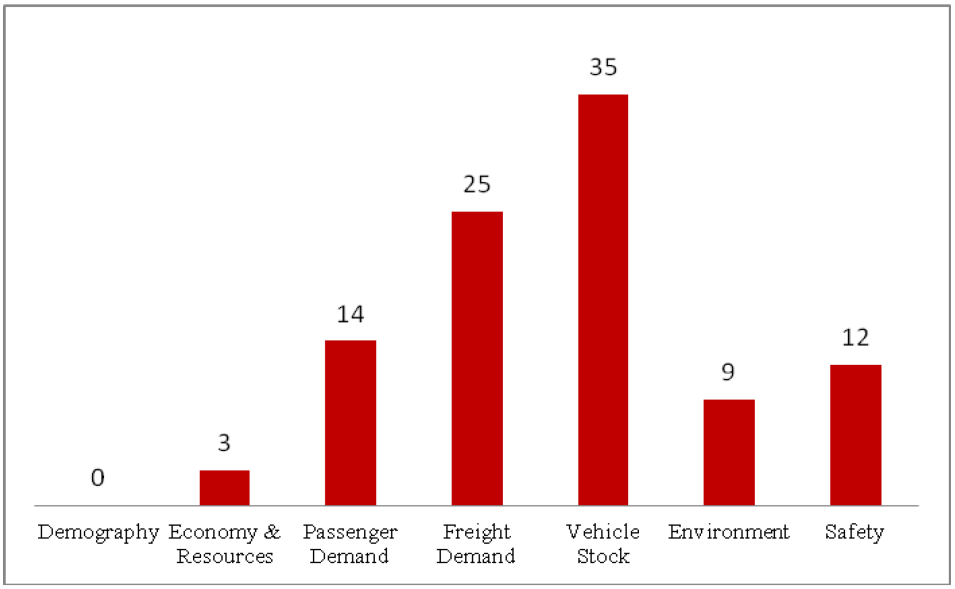

Figure 8: Transport Policy Measures by modules

4.2 Transport Policy Measures and Policy Levers

Condensing the scope of EU policy priorities presented in chapter 2 and referring to the results of surveys among future tool users of the European Commission (see Vanherle et al. 2014), following key focal points of transport policy had been identified: policies related to the GHG emissions reduction target; improving road safety and accomplishing the internal market. Thus, the Transport Policy Measures in the core of the tool are organised along four policy categories as shown in Table 7: efficiency standards and flanking measures, pricing, research and innovation, as well as internal market. Some of the policy measures fit to more than one policy category while in the table just one is listed.

Table 7: Transport Policy Measures addressed in HIGH-TOOL

Category	Single Transport Policy Measures addressed in HIGH-TOOL
Efficiency standards and flanking measures	Improving local public transport
	Deployment of efficient vehicles
	Replacement of inefficient LDVs and buses
	HDV limitation for urban areas
	LDV speed limit
	Diffusion of H_2 fuel cell cars
	Diffusion of electro cars
	Replacement of inefficient cars
Pricing	CO_2 feebates for road transport
	CO_2 certificate system for road transport
	Circulation tax for cars
	Internalisation of external costs
	HDV infrastructure change
	Urban road charging
Research and innovation	Intelligent road vehicles
	Dynamic traffic management for road
	Intelligent traffic information system for road
	Road vehicle safety technology protecting other transport users
	Safety systems for road vehicle users
Internal market	Acceleration of TEN-T implementation
	River information system
	European Rail Traffic Management System
	Harmonised handling of dangerous goods
	Harmonisation of rail safety
	Harmonised social rules for truck drivers
	Opening the internal IWW market
	Enhance service quality at ports
	Maritime traffic management system
	Freight corridor management
	Single rail vehicle authorisation and certification

The 30 policy measures are spread across all modes and a variety of policy topics. As the discussion about most policy measures is still ongoing the tool allows the user to use three dimensions to define a policy scenario for a policy assessment. The policy lever may vary

- in its value within a pre-defined interval preventing the user from abusing the system,
- the time horizon starting in the year 2010 to 2050 (by 5 year steps), and
- the geographic scope (at NUTS-0, 1 and 2 level).

The policy levers to translate the TPMs to the HIGH-TOOL model are manifold whereby some are specific for a policy while others are used in several TPMs. In Figure 8 the policy levers used for each TPM are displayed. The structure of the name of the policy lever contains information about the type (i = input, p = parameter), the module (pd = Passenger Demand, fd = Freight Demand, vs = Vehicle Stock, er = Energy & Resources, sa = Safety, ev = Environment), and the type of characteristic concerned.

Transport Policy Measure	Modules						
Policy Name	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety	
Urban road charging		i_pd_urban_dutoll	p_fd_load_factor				
Urban road charging			p_fd_speed				
Urban road charging			p_fd_toll_cost				
HDV infrastructure charge			p_fd_load_factor	i_vs_nf_rof_cst_othr			
HDV infrastructure charge			i_fd_toll_cost				
Internalisation of external costs		i_pd_core_toll_cost	i_fd_toll_cost	i_vs_nf_taxfuel			
Circulation tax for cars				i_vs_nf_rof_cst_othr			
Single European Sky		i_pd_link_time_weight		i_vs_nf_air_neoe_pas		i_sa_runway_collision_air	
Single European Sky		i_pd_imp_delta_los		i_vs_nf_air_neoe_fre		i_sa_mid-air_collision_air	
Safety systems for road vehicle users				i_vs_nf_cstinsu		i_sa_speed_truck, car, p2w, pt	
Safety systems for road vehicle users						i_sa_dui_truck, car, p2w, pt	
Safety systems for road vehicle users						i_sa_distraction_truck, car, p2w, pt	
Safety systems for road vehicle users						i_sa_fatigue_truck, car, p2w, pt	
Safety systems for road vehicle users						i_sa_restraint_truck, car	
Safety systems for road vehicle users						i_sa_time_med_care_truck, car, p2w, pt	
Safety systems for road vehicle users						i_sa_veh_defect_truck, car, p2w, pt	
Road vehicle safety technology protecting other transport users				i_vs_cap_rpcs_mkt		i_sa_blind_spot_truck	
Road vehicle safety technology protecting other transport users				i_vs_cap_tech		i_sa_speed_p2w, bike	
Road vehicle safety technology protecting other transport users						i_sa_distraction_p2w, bike	
Road vehicle safety technology protecting other transport users						i_sa_fatigue_p2w, bike	
Road vehicle safety technology protecting other transport users						i_sa_veh_defect_p2w, bike	
Road vehicle safety technology protecting other transport users						i_sa_helmet_bike	
Improvement of energy efficiency of vehicles				i_vs_cap_rpcs_mkt	i_ev_emfactor		
Improvement of energy efficiency of vehicles				i_vs_cap_tech			
Improvement of energy efficiency of vehicles							

Figure 9: Pre-defined transport policy measures and their policy levers

Transport Policy Measure	Modules					
Policy Name	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
New fuels and propulsion systems				i_vs_veh_stock	i_ev_emfactor	
New fuels and propulsion systems				i_vs_cap_rpcs_mkt		
New fuels and propulsion systems				i_vs_cap_tech		
European Rail Traffic Management System		i_pd_link_time_weight	p_fd_speed	i_vs_cap_rpcs_mkt		i_sa_osign_staff_error_rail
European Rail Traffic Management System		i_pd_imp_delta_los		i_vs_nf_rail_othc		i_sa_crew_error_rail
European Rail Traffic Management System						i_sa_track_staff_error_rail
River information system			p_fd_wait_time	i_vs_cstiww		
River information system			p_fd_load_time			
River information system			p_fd_unload_time			
River information system			p_fd_fixed_cost			
River information system			p_fd_var_cost			
Intelligent traffic information system for road		i_pd_link_time_weight	p_fd_speed	i_vs_cap_tech		
Intelligent traffic information system for road		i_pd_imp_delta_los				
Intelligent traffic information system for road		i_pd_link_time_weight	p_fd_speed	i_vs_cap_tech		
Intelligent traffic information system for road		i_pd_imp_delta_los				
Intelligent traffic information system for road		i_pd_link_time_weight	p_fd_speed	i_vs_cap_tech		i_sa_speed_truck, car, p2w, pt, bike
Intelligent traffic information system for road		i_pd_imp_delta_los				i_sa_time_med_care_truck, car, p2w, pt, bike
Replacement of inefficient cars				i_vs_veh_stock	i_ev_emfactor	
Replacement of inefficient cars				i_vs_cap_rpcs_mkt		
Replacement of inefficient cars				i_vs_cap_tech		
Diffusion of electro cars				i_vs_veh_stock	i_ev_emfactor	
Diffusion of electro cars				i_vs_cap_rpcs_mkt		
Diffusion of electro cars				i_vs_cap_tech		
Diffusion of H2 fuel cell cars				i_vs_veh_stock	i_ev_emfactor	
Diffusion of H2 fuel cell cars				i_vs_cap_rpcs_mkt		
Diffusion of H2 fuel cell cars				i_vs_cap_tech		

Figure 8: Pre-defined transport policy measures and their policy levers (cont.)

Transport Policy Measure	Modules						
Policy Name	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
Deployment of efficient vehicles	i_er_invest_rtd		p_fd_load_factor	i_vs_veh_stock	i_ev_emfactor	i_sa_speed_truck, car, p2w, pt, bike
Deployment of efficient vehicles			p_fd_speed	i_vs_cap_rpcs_mkt		i_sa_dui_truck, car, p2w, pt, bike
Deployment of efficient vehicles			p_fd_load_capacity	i_vs_cap_tech		i_sa_distraction_truck, car, p2w, pt, bike
Deployment of efficient vehicles						i_sa_fatigue_truck, car, p2w, pt, bike
Deployment of efficient vehicles						i_sa_restraint_truck, car
Deployment of efficient vehicles						i_sa_blind_spot_truck
Deployment of efficient vehicles						i_sa_veh_defect_truck, car, p2w, pt, bike
Deployment of efficient vehicles						i_sa_load_error_air
Deployment of efficient vehicles						i_sa_crew_error_rail, air
Deployment of efficient vehicles						i_sa_stock_fault_rail
Deployment of efficient vehicles						i_sa_engine_failure_air
Deployment of efficient vehicles						i_sa_tech_failure_air
Deployment of efficient vehicles						i_sa_runway_collision_air
Deployment of efficient vehicles						i_sa_fire_air
Deployment of efficient vehicles						i_sa_mid-air_collision_air
Deployment of efficient vehicles						i_sa_fat_risk_ivvw, sss
CO2 certificate system for road				i_vs_fu_exduty_eur_1000l		
CO2 feebates for road transport				i_vs_veh_stock		
CO2 feebates for road transport				i_vs_cap_rpcs_mkt		
CO2 feebates for road transport				i_vs_cap_tech		
CO2 feebates for road transport				i_vs_nf_rof_cst_othr		
Harmonisation of rail safety		i_pd_link_time_weight	p_fd_wait_time	i_vs_cap_rpcs_mkt		i_sa_osign_staff_error_rail
Harmonisation of rail safety		i_pd_imp_delta_los		i_vs_nf_rail_othc		i_sa_crew_error_rail
Harmonisation of rail safety						i_sa_track_staff_error_rail
Harmonisation of rail safety						i_sa_stock_fault_rail
Harmonisation of rail safety						i_sa_infra_fault_rail
Harmonisation of rail safety						i_sa_lc_veh_acc_rail
Harmonisation of rail safety						i_sa_lc_vuln_acc_rail
Harmonisation of rail safety						i_sa_trespassing_rail
Harmonisation of rail safety						i_sa_platform_acc_rail
Harmonisation of rail safety						i_sa_falling_from_train_rail

Figure 8: Pre-defined transport policy measures and their policy levers (cont.)

Transport Policy Measure	Modules						
Policy Name	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety	
Harmonized handling of dangerous			p_fd_wait_time	i_vs_nf_rof_cst_othr		i_sa_load_error_truck	
Harmonized handling of dangerous			p_fd_load_time			i_sa_stock_fault_rail	
Harmonized handling of dangerous			p_fd_unload_time			i_sa_fat_risk_sss	
Harmonized handling of dangerous						i_sa_fat_risk_iww	
CO2 emissions limits for road vehicles				i_vs_cap_rpcs_mkt	i_ev_emfactor		
CO2 emissions limits for road vehicles				i_vs_cap_tech			
Pollutant limits for road vehicles				i_vs_cap_rpcs_mkt	i_ev_emfactor		
Pollutant limits for road vehicles				i_vs_cap_tech			
LDV speed limit			p_fd_speed			i_sa_speed_truck	
LDV speed limit			i_fd_imp_dist				
Opening the internal rail market		i_pd_ae_time_weight	p_fd_wait_time	i_vs_nf_rail_othc			
Opening the internal rail market		i_pd_imp_delta_los					
Single rail vehicle authorisation and certification		i_pd_link_time_weight	p_fd_wait_time	i_vs_cap_rpcs_mkt			
Single rail vehicle authorisation and certification		i_pd_imp_delta_los		i_vs_cap_tech			
Single rail vehicle authorisation and certification				i_vs_nf_rail_othc			
Freight corridor management			p_fd_wait_time	i_vs_nf_rail_othc			
Freight corridor management			p_fd_load_time				
Freight corridor management			p_fd_unload_time				
Freight corridor management			p_fd_load_factor				
Access to rail infrastructure		i_pd_ae_time_weight	p_fd_wait_time	i_vs_nf_rail_othc			
Access to rail infrastructure		i_pd_imp_delta_los					
Enhance sercice quality at airports		i_pd_ae_time_weight	p_fd_wait_time	i_vs_nf_air_neoe_pas			
Enhance sercice quality at airports		i_pd_imp_delta_los	p_fd_load_time	i_vs_nf_air_neoe_fre			
Enhance sercice quality at airports			p_fd_unload_time				
Enhance sercice quality at airports			p_fd_speed				

Figure 8: Pre-defined transport policy measures and their policy levers (cont.)

Transport Policy Measure	Modules					
Policy Name	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
Maritime traffic management system			p_fd_wait_time			i_sa_fat_risk_sss
Maritime traffic management system			p_fd_load_time			
Maritime traffic management system			p_fd_unload_time			
Maritime traffic management system			p_fd_fixed_cost			
Enhance sercice quality at ports			p_fd_load_time	i_vs_nf_mar_opcost		
Enhance sercice quality at ports			p_fd_unload_time			
Enhance sercice quality at ports			p_fd_wait_time			
Opening the internal IWW market			p_fd_fixed_cost	i_vs_cstiww		i_sa_fat_risk_iww
Opening the internal IWW market			p_fd_wait_time			
Single European road market			p_fd_load_factor	i_vs_nf_rof_cst_othr		
Harmonized social rules for truck			p_fd_speed	i_vs_nf_rof_cst_labo		i_sa_speed_truck
Harmonized social rules for truck						i_sa_fatigue_truck
Accelaration of TEN-T implementation	i_er_delta_inf_inv	i_pd_link_time_weight	p_fd_speed	i_vs_nf_rof_cst_othr		
Accelaration of TEN-T implementation		i_pd_link_dist_weight	p_fd_wait_time			
Accelaration of TEN-T implementation		i_pd_core_toll_cost	p_fd_load_time			
Accelaration of TEN-T implementation			p_fd_unload_time			
Improving local public transport		i_pd_urban_dutraveltime				
Improving local public transport		i_pd_urban_duaetime				
Improving local public transport		i_pd_urban_dutraveldist				
HDV limitation for urban areas			p_fd_load_factor	i_vs_nf_rof_cst_othr		
Replacement of inefficient LDVs and buses	i_er_delta_inv		p_fd_load_factor	i_vs_cap_rpcs_mkt	i_ev_emfactor	
Replacement of inefficient LDVs and buses			p_fd_load_capacity	i_vs_cap_tech		

Figure 8: Pre-defined transport policy measures and their policy levers (cont.)

For the implementation of a customised TPM, the following policy levers are made available to the user:

Module	Policy lever name	Description
er	i_er_delta_inf_inv	Investments in infrastructure by region
er	i_er_delta_inv	Investment into fixed capital formation
er	i_er_delta_pd_costs	Change in automotive sector production costs due to innovations
er	i_er_delta_rtd	Investments in RTD by region
er	p_er_beta	CobbDouglas utility parameter
er	p_er_delta	Depreciation rate
er	p_er_epsilon	Elasticity parameter of accessibility
er	p_er_phi	Savingsrate
ev	i_ev_co2_content	CO2 content of fuel in tons CO2 per 1000l by country, mode and vehicle fuel
ev	i_ev_emfactor	Fuel consumption and emission factors in grams of pollutant per vehicle kilometer by mode, vehicle type, vehicle fuel and emission type
ev	i_ev_emindex	Emission indexes in gram per kilogramm emission by vehicle type
fd	i_fd_imp_dist	Distance impedances in kilometres by O/D at NUTS-2 level per distance band and mode
fd	i_fd_toll_cost	Average toll cost in euros/vkm by country and mode
fd	p_fd_air_share_full_freight	Share of freight transported by passenger flights
fd	p_fd_fixed_cost	Average fixed costs
fd	p_fd_fuel_cost	Average energy costs
fd	p_fd_load_capacity	Average load capacity
fd	p_fd_load_factor	Average load rate
fd	p_fd_load_time	Average loading time
fd	p_fd_speed	Average speed
fd	p_fd_trade_value	Commodity value in EUR (2010 constant prices)
fd	p_fd_unload_time	Average unloading
fd	p_fd_var_cost	Average variable costs
fd	p_fd_wait_time	Average waiting time
pd	i_pd_ae_dist_weight	Policy weight to influence access/ egress travel distance to network by region and mode
pd	i_pd_ae_time_weight	Policy weight to influence access/ egress travel time to network by region and mode
pd	i_pd_core_toll_cost	Average toll costs per vehicle kilometre in euros by country and mode
pd	i_pd_core_traveltimelevel	Level of travel time in relation to reference year by mode and country (travel time improvement i.e. level < 1.0)
pd	i_pd_link_dist_weight	Policy weight to influence travel distance on link by mode
pd	i_pd_link_time_weight	Policy weight to influence travel time on link by mode
pd	i_pd_urban_duaetime	Specific utility parameter referring to differences in access/ egress time between reference year and forecast year
pd	i_pd_urban_dutoll	Specific utility parameter referring to differences in urban road charging between reference year and forecast year
pd	i_pd_urban_dutraveldist	Specific utility parameter referring to differences in travel distance between reference year and forecast year
pd	i_pd_urban_dutraveltime	Specific utility parameter referring to differences in travel time between reference year and forecast year

Figure 10: Policy levers for customised transport policy measures

Module	Policy lever name	Description
sa	i_sa_blind_spot_truck	Truck blind spots (in percentage change) compared to 2010 by country
sa	i_sa_crew_error_air	Air crew error (in percentage change) compared to 2010 by country
sa	i_sa_crew_error_rail	Rail crew error (in percentage change) compared to 2010 by country
sa	i_sa_distraction_bike	Bike distraction (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_distraction_car	Car distraction (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_distraction_p2w	P2w distraction (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_distraction_pt	Public transport distraction (in percentage change) compared to 2010 by country
sa	i_sa_distraction_truck	Truck distraction (in percentage change) compared to 2010 by country
sa	i_sa_dui_bike	Bike driving under influence (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_dui_car	Car driving under influence (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_dui_p2w	P2w driving under influence (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_dui_pt	Public transport driving under influence (in percentage change) compared to 2010 by country
sa	i_sa_dui_truck	Truck driving under influence (in percentage change) compared to 2010 by country
sa	i_sa_engine_failure_air	Air engine failure (in percentage change) compared to 2010 by country
sa	i_sa_falling_from_train_rail	Rail falling from train (in percentage change) compared to 2010 by country
sa	i_sa_fat_risk_iww	Fatality risk inland waterways (in percentage change) compared to 2010 by country
sa	i_sa_fat_risk_sss	Fatality risk short sea shipping (in percentage change) compared to 2010 by country
sa	i_sa_fatigue_bike	Bike fatigue (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_fatigue_car	Car fatigue (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_fatigue_p2w	P2w fatigue (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_fatigue_pt	Public transport fatigue (in percentage change) compared to 2010 by country
sa	i_sa_fatigue_truck	Truck fatigue (in percentage change) compared to 2010 by country
sa	i_sa_fire_air	Air fire on board (in percentage change) compared to 2010 by country
sa	i_sa_helmet_bike	Bike use of helmets (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_helmet_p2w	P2w use of helmets (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_infra_fault_bike	Bike infrastructural faults (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_infra_fault_car	Car infrastructural faults (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_infra_fault_p2w	P2w infrastructural faults (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_infra_fault_pt	Public transport infrastructural faults (in percentage change) compared to 2010 by country
sa	i_sa_infra_fault_rail	Rail infrastructural fault (in percentage change) compared to 2010 by country
sa	i_sa_infra_fault_truck	Truck infrastructural faults (in percentage change) compared to 2010 by country

Figure 9: Policy levers for customised transport policy measures (cont.)

Module	Policy lever name	Description
sa	i_sa_lc_veh_acc_rail	Rail level-crossing accident vehicle (in percentage change) compared to 2010 by country
sa	i_sa_lc_vuln_acc_rail	Rail level-crossing accident vulnerable user (in percentage change) compared to 2010 by country
sa	i_sa_load_error_air	Air weight/balance errors (in percentage change) compared to 2010 by country
sa	i_sa_load_error_truck	Truck loading error (in percentage change) compared to 2010 by country
sa	i_sa_mid_air_collision_air	Air mid-air collisions (in percentage change) compared to 2010 by country
sa	i_sa_osign_staff_error_rail	Rail operating and signalling staff error (in percentage change) compared to 2010 by country
sa	i_sa_platform_acc_rail	Rail platform accident (in percentage change) compared to 2010 by country
sa	i_sa_restraint_car	Car use of restraint devices (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_restraint_truck	Truck use of restraint devices (in percentage change) compared to 2010 by country
sa	i_sa_runway_collision_air	Air runway collisions (in percentage change) compared to 2010 by country
sa	i_sa_speed_bike	Bike speed (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_speed_car	Car speed (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_speed_p2w	P2w speed (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_speed_pt	Public transport speed (in percentage change) compared to 2010 by country
sa	i_sa_speed_truck	Truck speed (in percentage change) compared to 2010 by country
sa	i_sa_stock_fault_rail	Rail rolling stock fault (in percentage change) compared to 2010 by country
sa	i_sa_tech_failure_air	Air technical failure excl. engine (in percentage change) compared to 2010 by country
sa	i_sa_time_med_care_bike	Bike time to medical care (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_time_med_care_car	Car time to medical care (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_time_med_care_p2w	P2w time to medical care (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_time_med_care_pt	Public transport time to medical care (in percentage change) compared to 2010 by country
sa	i_sa_time_med_care_truck	Truck time to medical care (in percentage change) compared to 2010 by country
sa	i_sa_track_staff_error_rail	Rail track staff error (in percentage change) compared to 2010 by country
sa	i_sa_trespassing_rail	Rail trespassing accident (in percentage change) compared to 2010 by country
sa	i_sa_veh_defect_bike	Bike vehicle defects (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_veh_defect_car	Car vehicle defects (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_veh_defect_p2w	P2w vehicle defects (in percentage change) compared to 2010 by country, agegroup and gender cohort
sa	i_sa_veh_defect_pt	Public transport vehicle defects (in percentage change) compared to 2010 by country
sa	i_sa_veh_defect_truck	Truck vehicle defects (in percentage change) compared to 2010 by country
vs	i_vs_cap_rpcs_mkt	Average road vehicle purchase price (with VAT) in euros per vehicle by country, mode, vehicle type and fuel
vs	i_vs_cap_rpcs_vat	Average road vehicle purchase VAT in euros per vehicle by country, mode, vehicle type and fuel
vs	i_vs_cap_scrap_subs	Average state subsidy to scarp old car in euros per vehicle by country, mode, vehicle type and fuel
vs	i_vs_cap_subsidy	Average state subsidy to buy cleaner car in euros per vehicle by country, mode, vehicle type and fuel
vs	i_vs_cap_tech	Technology related additional capital cost in euros per vehicle by country, mode, vehicle type and fuel
vs	i_vs_cstiww	Inland water ways costs in euros per vehicle kilometer by country, mode and vehicle fuel

Figure 9: Policy levers for customised transport policy measures (cont.)

Module	Policy lever name	Description
vs	i_vs_fu_ct	Carbon tax in euros per tonne CO2 by country, mode and vehicle fuel
vs	i_vs_fu_exduty_eur_1000kg	Fuel excise duty data in euros per tonne by country, mode and vehicle fuel
vs	i_vs_fu_exduty_eur_1000l	Fuel excise duty data in euros per 1000l by country, mode and vehicle fuel
vs	i_vs_fu_exduty_eur_gj	Fuel excise duty data in euros per giga joule fuel by country, mode and vehicle fuel
vs	i_vs_fu_exduty_eur_kwh	Fuel excise duty data in euros per kilo watt hour by country, mode and vehicle fuel
vs	i_vs_fu_fuel_resource_toe	Fuel resource cost in euros per toe by country, mode and vehicle fuel
vs	i_vs_fu_vat_eur_1000kg	Fuel value added tax (VAT) in euros per tonne by country, mode and vehicle fuel
vs	i_vs_fu_vat_eur_1000l	Fuel value added tax (VAT) in euros per 1000 l by country, mode and vehicle fuel
vs	i_vs_fu_vat_eur_gj	Fuel value added tax (VAT) for fuel types in eur per GJ
vs	i_vs_fu_vat_eur_kwh	Fuel value added tax (VAT) in euro per kilo watt hour
vs	i_vs_nf_air_neoe_fre	Non energy related variable freight air transport costs in euros per tonne kilometer by mode, vehicle type and fuel
vs	i_vs_nf_air_neoe_pas	Non energy related variable passenger air transport costs in euros per passenger kilometer by mode, vehicle type and fuel
vs	i_vs_nf_cstinsu	Insurance costs for road transport in euros per vehicle kilometer by country, mode, vehicle type and fuel
vs	i_vs_nf_mar_chcost	Cargo handling cost for maritime transport in euros per vehicle by mode, vehicle type and fuel
vs	i_vs_nf_mar_oi_vcost	Voyage cost for maritime transport in euros per vehicle by mode, vehicle type and fuel
vs	i_vs_nf_mar_opcost	Non fuel operational cost for maritime transport in euros per vehicle by mode, vehicle type and fuel
vs	i_vs_nf_mar_repmaintc	Repair and maintenance costs of maritime vehicles in euros per vehicle by mode, vehicle type and fuel
vs	i_vs_nf_rail_crec	Crew costs of road and rail public transport in euros per hour by mode, vehicle type and fuel
vs	i_vs_nf_rail_damc	Damage load cost for road and rail public transport in euros per vehicle day by mode, vehicle type and fuel
vs	i_vs_nf_rail_othc	Other costs for road and rail public transport in euros per tonne kilometer by mode, vehicle type and fuel
vs	i_vs_nf_rail_repmaintc	Repair and maintenance costs of rail vehicles in euros per vehicle kilometer by mode, vehicle type and fuel
vs	i_vs_nf_road_repmaintc	Repair and maintenance costs of road vehicles in euros per vehicle kilometer by country, mode, vehicle type and fuel
vs	i_vs_nf_rof_cst_labo	Labour cost for freight road transport in euros per tonne kilometer by country, mode, vehicle type and fuel
vs	i_vs_nf_rof_cst_othr	Other non-fuel operational costs for freight road transport in euros per tonne kilometer by country, mode, vehicle type and fuel
vs	i_vs_nf_rof_cst_time	Non fuel operational time cost for road transport in euros per tonne kilometer by country, mode, vehicle type and fuel
vs	i_vs_nf_taxfuel	Additional fuel tax for freight road transport in euros per tonne kilometer by country, mode, vehicle type and fuel
vs	i_vs_nf_taxinsu	Insurance tax for road transport in euros per tonne kilometer by country, mode, vehicle type and fuel
vs	i_vs_nf_taxown	Ownership tax for road transport in euros per tonne kilometer by country, mode, vehicle type and fuel
vs	i_vs_nf_taxregs	Registration tax for road transport in euros per tonne kilometer by country, mode, vehicle type and fuel
vs	i_vs_veh_stock	Input vehicle stock in thousands by country, mode, vehicle type and fuel
vs	p_vs_fu_emfactor	Emission factor as described in the EU Energy Tax Directive (ETD): minima of excise duty
vs	p_vs_fu_nrg_content	Energy content of fuel
vs	p_vs_rail_spec_whour	Working hours per year for rail

Figure 9: Policy levers for customised transport policy measures (cont.)

4.3 Description of the Single Transport Policy Measures

This chapter is dedicated to the description of the transport policy measures. To allow for a standardised comparison of the TPMs, a template has been used to structure the content. The template to describe a transport policy is split into three sections. The first one, section A, concentrates on the formal matters to assign a transport policy to its area and category according to the source, the White Paper. In addition the TPM is described and the main targets are listed.

Section B is dedicated to the principle influence of the policy measure on transport performance and quality, economy and resources as well as on safety and environmental issues. Arrows classify the influence as strong or marginal increase/decrease and in the case of no influence is expected as unrelated. Both sections of transport, passenger and freight, are treated separately as some TPMs are of constrained influence.

The third section C is the most important one for the translation of a transport policy measure into policy levers. Here it is marked whether one of the HIGH-TOOL modules is affected directly and the specific variable affected is depicted. In fact a transport policy is mapped upon variables of a module so that it is made transparent how and where a scenario input of a user will influence the HIGH-TOOL model. As the policy measures can be complex, more than one lever of one module as well as several levers of multiple modules can be addressed.

Throughout all sections of the template comment boxes allows for explanations such as interpretation hints or limitations. Figure 10 displays the template describing a transport policy measure in a standardised way.

Section																										
A		0	Policy name																							
		1	Policy Area																							
		2	Policy Category																							
		3	Policy Subcategory																							
		4	Transport Policy Measure																							
		5	Main Targets																							
		6	White Paper Reference																							
B				Passenger						Freight							Sectoral									
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services					
	Indirect Traffic Impacts	7	Volume [passenger/tons]																							
		8	Transport performance [vkm]																							
		9	Transport performance [pkm/tkm]																							
	Direct Traffic Impacts	10	Travel time [min]																							
		11	Travel distance [km]																							
		12	Out of pocket costs [EUR/vkm]																							
		13	Other cost components [EUR/vkm]																							
		14	Qualitative effects (e.g. liability, …)																							
		15	Comments																							
	Direct Economical Impacts	16	Economic growth [gdp]																							
		17	Employment [#employed]																							
		18	Resources: Energy																							
		19	Resources: Material																							
		20	Other																							
		21	Comments																							
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																							
		23	Other																							
		24	Comments																							
	Direct Environmental Impacts	25	GHG emissions [g/vkm]																							
		26	(Local) air pollution [g/vkm]																							
		27	Other																							
		28	Comments																							
C	TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety																
		29	HT Modules addressed by TPM																							
	TPM policy levers	30	Demography																							
		31	Economy & Resources																							
		32	Passenger Demand																							
		33	Freight Demand																							
		34	Vehicle Stock																							
		35	Environment																							
		36	Safety																							
		37	Comments																							
		47	References																							
		48	Performed by																							

Figure 11: Transport Policy Measure template

Based on the template outlined the 30 pre-defined transport policy measures addressed by HIGH-TOOL are shown in the Annex, part 1.1.

4.4 Transport Policy Measures Embedded in the EU Reference Scenario 2013

As the HIGH-TOOL model is calibrated to reflect the EU Reference Scenario 2013 certain transport policies are already assumed to be implemented up to the time horizon 2050. Thereof five TPMs concern the internal market category while two TPMs are assigned to each of the two categories 'efficiency standards and flanking measures' as well as 'research and innovation'. The transport policies concerned are:

- Opening the internal rail market
  Open the domestic rail passengers market to competition, including mandatory award of public service contracts under competitive tendering. Open the domestic rail passengers market to competition to improve the attractiveness, competitiveness and service quality of passenger railway transportation (see Community railway liberalisation SEC(2004)236, COM(2004)139). The policy is set to simulate the EU open competition between rail passenger operators and the availability of an integrated Europe-wide railway network, assuming an impact on travel time and costs of passenger transport.
- Access to rail infrastructure
  Ensure effective and non-discriminatory access to rail infrastructure, including rail-related services, in particular through structural separation between infrastructure management and service provision. The policy is set to enhance competition in the rail market.
- Single European Sky
  Deployment of next generation of air traffic management system (SESAR) in the agreed time frame. Enable the Single European Sky, i.e. tripling air space capacity in Europe, increase safety in air transport by a power of ten, decrease emissions of air transport by 10%, and decrease applying ATM costs by at least 50%.
- Enhance service quality at airports
  Clarify and improve conditions to enter and provide quality services, including ground-handling while ensuring that all actors in an airport system meet minimum quality standards. The policy is set to enable access to airport infrastructure at a fair price to airlines, to improve aviation security checks at airports for the benefit of passengers and other stakeholders. Furthermore the policy shall encourage investments, especially through the use of innovative financial instruments, so as to steer growth, secure cohesion within the EU and enhance its economic, societal and cultural links with the rest of the world.

- Single European road market
  Elimination of market restrictions on road transport to establish a single European road transport market by eliminating the restrictions on cabotage, and thus full liberalisation.
- Improvement of energy efficiency of vehicles
  Technological innovation on vehicle efficiency through new engines, materials and design. Further improvement of energy efficiency of all vehicles to decrease energy demand and to reduce CO_2-emissions.
- New fuels and propulsion systems
  Technological innovation on new fuels and propulsion systems to achieve cleaner energy use for all modes of passenger and freight transport. Increase adoption of next generation bio-fuels and the penetration of electric vehicles and other propulsion systems (CNG, LPG, …).
- CO_2 emissions limits for road vehicles
  The policy is set to simulate restrictive limits on CO_2 emissions from new vehicles (cars and trucks). The activation of this measure corresponds to improved fuel efficiency of new vehicles purchased. The reduced fuel consumption results in reduced CO_2 emissions from new vehicles.
- Pollutant limits for road vehicles
  Standards for controlling air pollution (CO, NO_x, particulate matter). The policy is set to simulate restrictive limits on pollutant emissions from new vehicles (cars and trucks). The activation of this measure corresponds to improved pollutant emission factors (for CO, NO_x, particulate matter) related to the emission standards after EUR VI (EUR VII and more).

Based on the template outlined in the previous chapter the nine transport policy measures already embedded in the EU Reference Scenario 2013 are documented in the Annex, part 1.2.

The user has to keep in mind that any interpretation of assessment results are based on the assumption that the aforementioned nine TPMs which are already active throughout the whole time horizon up to 2050. They can neither be modified nor switched off as they are implemented as fixed policy measures according to the definition of the EU Reference Scenario 2013. As rule of thumb a continuous implementation of the policies had been assumed.

In this context it has to be pointed out that the implementation of the TEN-T infrastructure projects is as well assumed to be part of the EU Reference Scenario 2013 whereby the core network is planned to be completed by 2030 and the comprehensive one by 2050. HIGH-TOOL allows for an acceleration policy which shifts the final implementation towards earlier years. If this TPM is activated, the implementation of the Core TEN-T Network is assumed to be completed by the year 2025 instead of 2030, and the Comprehensive TEN-T Network by the year 2040 instead of 2050.

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Vanherle K., Corthout R., Szimba E., Meyer C., Kiel J., Ulied A., Biosca O., Török R. (2014): User Requirements, HIGH-TOOL Deliverable D1.1, project co-funded by the European Commission under the 7th Framework Programme, Karlsruhe.

6 Other Project Resources

ETISplus (European Transport Policy Information System Development and Implementation of Data Collection Methodology for EU Transport Modelling): http://www.transport-research.info/web/projects/project_details.cfm?id=41679.

EXIOBASE (Global, detailed Multi-regional Environmentally Extended Supply and Use/Input Output database): http://exiobase.eu/component/content/?view=featured.

EXIOMOD (Regional economic model for advanced trade & transport scenario analysis on a national, regional and global scale): http://www.polfree.eu/publications/documents/EXIOMOD.

EXIOPOL (Environmental accounting framework using externality data and input-output tools for policy analysis.): http://www.feem-project.net/exiopol/.

HIGH-TOOL (Strategic high-level transport model): http://www.high-tool.eu.

RAEM (Spatial CGE model and explicitly considers interregional transportation and labour flows): http://www.tmleuven.be/project/raem/home.htm.

RHOMOLO (Regional holistic model): http://www.tmleuven.be/project/rhomolo/home.htm.

TRANSTOOLS (Tools for Transport Forecasting and Scenario Testing): http://www.transport-research.info/web/projects/project_details.cfm?ID=11088.

TTv3 (Research and development of the European Transport Network Model, TRANSTOOLS Version 3): http://www.transport-research.info/web/projects/project_details.cfm?id=41354.

VERSIT (Discrete model to simulate the traffic emissions of CO_2, NO_x and PM on the basis of the instantaneous velocity and acceleration of a vehicle): http://www.delftdimensions.nl/versit.aspx.

Deliverable D2.2 Annex

Final Structure of HIGH-TOOL Model

Table of Contents

1 Transport Policy Measure Template Tables

1.1 Pre-Defined TPM Templates

1.1.1 General Template

Section																									
A		0	Policy name																						
		1	Policy Area																						
		2	Policy Category																						
		3	Policy Subcategory																						
		4	Transport Policy Measure																						
		5	Main Targets																						
		6	White Paper Reference																						
B				Passenger							Freight								Sectoral						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes		Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime		Overall	Aggricultural	Industrial	Transport	Other Services		
	Indirect Traffic Impacts	7	Volume [passenger/tons]																						
		8	Transport performance [vkm]																						
		9	Transport performance [pkm/tkm]																						
	Direct Traffic Impacts	10	Travel time [min]																						
		11	Travel distance [km]																						
		12	Out of pocket costs [EUR/vkm]																						
		13	Other cost components [EUR/vkm]																						
		14	Qualitative effects (e.g. liability, ...)																						
		15	Comments																						
	Direct Economical Impacts	16	Economic growth [gdp]																						
		17	Employment [#employed]																						
		18	Resources: Energy																						
		19	Resources: Material																						
		20	Other																						
		21	Comments																						
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																						
		23	Other																						
		24	Comments																						
	Direct Environmental Impacts	25	GHG emissions [g/vkm]																						
		26	(Local) air pollution [g/vkm]																						
		27	Other																						
		28	Comments																						

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM							
	TPM policy levers	30	Demography							
		31	Economy & Resources							
		32	Passenger Demand							
		33	Freight Demand							
		34	Vehicle Stock							
		35	Environment							
		36	Safety							
		37	Comments							
		47	References							
		48	Performed by							

1.1.2 Single Rail Vehicle Authorisation and Certification (2)

Section				
A		0	Policy name	Single rail vehicle authorisation and certification
		1	Policy Area	5 Internal market
		2	Policy Category	Internal market
		3	Policy Subcategory	5.1.2 Rail - internal market
		4	Transport Policy Measure	Achieve a single rail vehicle type authorisation and a single railway undertaking safety certification by reinforcing the role of the European Railway Agency (ERA).
		5	Main Targets	Strengthen the European Railway Agency and ensure European railway saftey harmonisation.
		6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 1: A true internal market for rail services

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]	⇗		⇘				⇗		⇘		⇘		
		8	Transport performance [vkm]	⇗		⇘				⇗		⇘		⇘		
		9	Transport performance [pkm/tkm]	⇗		⇘				⇗		⇘		⇘		
	Direct Traffic Impacts	10	Travel time [min]	⇘						⇘						
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]													
		13	Other cost components [EUR/vkm]	⇘						⇘						
		14	Qualitative effects (e.g. liability, ...)	While this measure aims to increase competition between operators, it is hampered by the monopoly inherent in infrastructure management at least for freight.												
		15	Comments	Harmonisation of fleet allows to reduce vehicle investment costs and time savings on cross border rail services. But a harmonisation of safety standards to the upper quality standard also leads to (momentary) increase of costs.												
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other													
		21	Comments													
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]	⇒						⇒						
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]													
		26	(Local) air pollution [g/vkm]													
		27	Other													
		28	Comments													

				Sectoral				
				Overall	Aggricultural	Industrial	Transport	Other Services
		16	Economic growth [gdp]	⇒	⇒	⇒	⇗	⇒
		17	Employment [#employed]	⇒	⇒	⇒	⇗	⇒
		18	Resources: Energy					
		19	Resources: Material					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	✗	✗	✓	✓	✓	✗	✗
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	i_pd_link_time_weight, i_pd_imp_delta_los (level of service)						
		33	Freight Demand	p_fd_wait_time						
		34	Vehicle Stock	i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (vehicle capital costs - technology related), i_vs_nf_rail_othc (non fuel operational						
		35	Environment	n/a						
		36	Safety	n/a						
		37	Comments							
		47	References	European Commission (2008): Towards an integrated European railway area. Office for Official Publications of the European Communities, Luxembourg. European Commission (2011c): Summary of the Impact Assessment - Accompanying document to the White Paper Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system (SEC(2011) 358 final, SEC(2011) 391 final, COM (2011) 144 final Roland Berger (2011): Executive Radar 2011. European Rail Industry, Survey Safety: - ERA Annual Safety Performance Reports - Fawler et al. (2012) Prospective study into Harmonised Train Accident Precursors Analysis and Management - Maury Hill and associates, A STUDY OF THE ROLE OF HUMAN FACTORS IN RAILWAY OCCURRENCES AND POSSIBLE MITIGATION STRATEGIES						
		48	Performed by	KIT						

1.1.3 Freight Corridor Management (3)

Section				
A		0	Policy name	Freight corridor management
		1	Policy Area	5 Internal market/ 3. Research and innovation
		2	Policy Category	Internal market
		3	Policy Subcategory	5.1.2 Rail - internal market/ 3.2.3 Technology and infrastructure
		4	Transport Policy Measure	Develop an integrated approach to rail freight corridor management, including rail track access charges.
		5	Main Targets	Integrated approach to freight corridor management.
		6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 1: A true internal market for rail services

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]							⇗		⇘		⇘		
		8	Transport performance [vkm]							⇗		⇘		⇘		
		9	Transport performance [pkm/tkm]							⇗		⇘		⇘		
	Direct Traffic Impacts	10	Travel time [min]							⇘						
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]							⇘						
		13	Other cost components [EUR/vkm]							⇒						
		14	Qualitative effects (e.g. liability, ...)													
		15	Comments													
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other													
		21	Comments													
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]													
		26	(Local) air pollution [g/vkm]													
		27	Other													
		28	Comments													

				Sectoral				
				Overall	Aggricultural	Industrial	Transport	Other Services
B	Indirect Traffic Impacts	7	Volume [passenger/tons]					
		8	Transport performance [vkm]					
		9	Transport performance [pkm/tkm]					
	Direct Traffic Impacts	10	Travel time [min]					
		11	Travel distance [km]					
		12	Out of pocket costs [EUR/vkm]					
		13	Other cost components [EUR/vkm]					
		14	Qualitative effects (e.g. liability, ...)					
		15	Comments					
	Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇗	⇒
		17	Employment [#employed]	⇒	⇒	⇒	⇗	⇒
		18	Resources: Energy					
		19	Resources: Material					
		20	Other					
		21	Comments					
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]					
		23	Other					
		24	Comments					
	Direct Environmental Impacts	25	GHG emissions [g/vkm]					
		26	(Local) air pollution [g/vkm]					
		27	Other					
		28	Comments					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	X	X	X	✓	✓	X	X

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	n/a
	33	Freight Demand	p_fd_wait_time, p_fd_load_time, p_fd_unload_time, p_fd_load_factor
	34	Vehicle Stock	i_vs_nf_rail_othc (non fuel operational cost)
	35	Environment	n/a
	36	Safety	n/a
	37	Comments	
	47	References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet 58 (Kritzinger et al., 2013) European Commission (2005): Communication from the Commission to the European parliament and the council on the deployment of the European rail signalling system ERTMS/ETCS. COM(2005)298 final European Commission (2010): Accompanying document to the Proposal - Establishing a single European railway area, SEC(2010) 1042 final, Brussels
	48	Performed by	KIT

1.1.4 Maritime Traffic Management System (10)

Section A			
	0	Policy name	Maritime traffic management system
	1	Policy Area	5 Internal market/ 3 Research and innovation
	2	Policy Category	Internal market
	3	Policy Subcategory	5.1.4 Maritime internal market/ 3.1.3 Transport information systems, management and service
	4	Transport Policy Measure	Integrate the use of monitoring tools by all relevant authoritiesresponsible for maritime traffic, ensure the full interoperability between ICT systems in the waterborne sectors, guarantee the monitoring of vessels and freight ("Blue Belt") and set up appropriate port facilities ("Blue Lanes").
	5	Main Targets	Reduce administrative procedures for sea transport (cargo and passengers) between European ports and reduce congestion in ports and port fairways in order to increase the competitiveness of maritime transport compared to road, rail and air transport.
	6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 4: A maritime "Blue Belt" and market access to ports

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]							⇒		⇒		⇗	⇗	⇗
	8	Transport performance [vkm]							⇒		⇒		⇗	⇗	⇗
	9	Transport performance [pkm/tkm]							⇒		⇒		⇗	⇗	⇗
Direct Traffic Impacts	10	Travel time [min]												⇘	⇘
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]												⇒	⇒
	13	Other cost components [EUR/vkm]												⇘	⇘
	14	Qualitative effects (e.g. liability, …)													
	15	Comments	The effects are varying due to the different components of the policy. Whereas improving IT services from and to ports means increasing traffic from and to ports, the re-evaluation of the 40 mEUR threshold could reduce subsidies for smaller ports and therefore increase the port charges. Moreover, limited subsidies could also decrease the investment on new facilities consequently affecting the maximum traffic. However, considering solely the IT services deployment, the (sea/ inland waterway) port access/ waiting times are expected to decrease therefore, making water transport more atttractive. This change in throughput time and consequently in costs will increase the maritime demand and shift hinterland demand from road/ rail to inland/ short sea (assuming there is enough handling capacity).											
Direct Economical Impacts	16	Economic growth [gdp]													
	17	Employment [#employed]													
	18	Resources: Energy													
	19	Resources: Material													
	20	Other													
	21	Comments													
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													⇘
	23	Other													
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other													
	28	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]	⇒		⇒	⇗	
	17	Employment [#employed]	⇒		⇒	⇗	
	18	Resources: Energy					
	19	Resources: Material					

C

			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
TPM translation	29	HT Modules addressed by TPM	X	X	X	✓	X	X	✓

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	n/a
	33	Freight Demand	p_fd_load_time, p_fd_unload_time, p_fd_wait_time, p_fd_fixed_cost
	34	Vehicle Stock	n/a
	35	Environment	n/a
	36	Safety	i_sa_fat_risk_sss (fatality risk short sea)
	37	Comments	
	47	References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet 26 (Kritzinger et al., 2013). Safety: EMSA Accident Review reports Baker & Seah, Maritime Accidents and Human Performance: the Statistical Trail
	48	Performed by	KIT

1.1.5 Enhance Service Quality at Ports (12)

Section				
A		0	Policy name	Enhance sercice quality at ports
		1	Policy Area	5 Internal market
		2	Policy Category	Internal market
		3	Policy Subcategory	5.1.4 Maritime internal market
		4	Transport Policy Measure	Review restrictions on provision for port services
		5	Main Targets	Open port services, like technical-nautical and cargo handling services, to competition to reduce costs and enhance quality and reliability.
		6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 4: A maritime "Blue Belt" and market access to ports

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]							⇒	⇒	⇒	⇒	⇒	⇗	⇒
		8	Transport performance [vkm]							⇒	⇒	⇒	⇒	⇒	⇗	⇒
		9	Transport performance [pkm/tkm]							⇒	⇒	⇒	⇒	⇒	⇗	⇒
	Direct Traffic Impacts	10	Travel time [min]													
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]													
		13	Other cost components [EUR/vkm]												⇘	⇘
		14	Qualitative effects (e.g. liability, ...)	Increased interoperability between ICT systems and waterborne sectors												
		15	Comments	Possibly a marginal decrease of administrative costs resulting in a minor modal shift to Short sea from rail, inland waterway and road.												
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other													
		21	Comments													
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]													
		26	(Local) air pollution [g/vkm]													
		27	Other													
		28	Comments													

				Sectoral				
				Overall	Aggricultural	Industrial	Transport	Other Services
B	Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇗	⇒
		17	Employment [#employed]	⇒	⇒	⇒	⇗	⇒
		18	Resources: Energy					
		19	Resources: Material					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	X	X	X	✓	✓	X	X
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	n/a						
		33	Freight Demand	p_fd_load_time, p_fd_unload_time, p_fd_wait_time						
		34	Vehicle Stock	i_vs_nf_mar_opcost (non fuel operational costs)						
		35	Environment	n/a						
		36	Safety	n/a						
		37	Comments							
		47	References	PwC (2013): Impact assessment on: "Measures to enhance the efficiency and quality of port						
		48	Performed by	KIT						

1.1.6 Opening the Internal IWW Market (14)

Section A

0	Policy name	Opening the internal IWW market
1	Policy Area	5 Internal market
2	Policy Category	Internal market
3	Policy Subcategory	5.1.3 Inland waterway transport internal market
4	Transport Policy Measure	Establishes an appropriate framework to optimise the Internal Market for Inland Waterway Transport, and to remove barriers that prevent its increased use. Assesses and defines the necessary tasks and mechanisms for their execution, also with a view to the wider European context.
5	Main Targets	Optimise Internal Market for Inland Waterway Transport to improve efficiency and reduce transport costs related to regulations and administrative barriers.
6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 5: A suitable framework for inland navigation

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]							⇘		⇘		⇗		
	8	Transport performance [vkm]							⇘		⇘		⇗		
	9	Transport performance [pkm/tkm]							⇘		⇘		⇗		
Direct Traffic Impacts	10	Travel time [min]											⇒		
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]											⇘		
	13	Other cost components [EUR/vkm]											⇘		
	14	Qualitative effects (e.g. liability, ...)													
	15	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇗	
	17	Employment [#employed]	⇒	⇒	⇒	⇗	
	18	Resources: Energy					
	19	Resources: Material					
	20	Other					
	21	Comments					
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]					
	23	Other					
	24	Comments	Solve non-compliance with existing working and resting time regulations of a number of enterprises can improve significantly safety conditions of operations. [1]				
Direct Environmental Impacts	25	GHG emissions [g/vkm]					
	26	(Local) air pollution [g/vkm]					
	27	Other					
	28	Comments					

C

		Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
TPM translation	29 HT Modules addressed by TPM	✗	✗	✗	✓	✓	✗	✓

TPM policy levers	30 Demography	n/a
	31 Economy & Resources	n/a
	32 Passenger Demand	n/a
	33 Freight Demand	p_fd_fixed_cost, p_fd_wait_time
	34 Vehicle Stock	i_vs_cstiww (IWW costs)
	35 Environment	n/a
	36 Safety	i_sa_fat_risk_iww (fatality risk iww)
	37 Comments	
	47 References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet 24 (Kritzinger et al., 2013). [1] European Commission (2008): Finanl Report for the "Study on Administrative and Regulatory Barriers in the field of Inland Waterway Transport" - Part A.
	48 Performed by	KIT

1.1.7 Harmonized Social Rules for Truck Drivers (23)

Section				
A		0	Policy name	Harmonized social rules for truck drivers
		1	Policy Area	5 Internal market
		2	Policy Category	Internal market
		3	Policy Subcategory	5.3 Multimodal transport
		4	Transport Policy Measure	EU-wide common job quality and working conditions for truck drivers SEC(2008)2632 Policy set to simulate the regulation of job quality and working conditions for truck drivers, assuming an impact on travel costs and travel time for the truck mode.
		5	Main Targets	The TPM is introduced to ensure minimum harmonized social rules throughout the EU. In addition, other objectives are related to create fair conditions for competition, to promote and harmonise safer technical standards and conditions, to guarantee that road transport rules are applied effectively and without discrimination.
		6	White Paper Reference	1.2. Promoting quality jobs and working conditions

B				Passenger						Freight							Sectoral				
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
	Indirect Traffic Impacts	7	Volume [passenger/tons]							⇒		⇒									
		8	Transport performance [vkm]								⇒	⇒									
		9	Transport performance [pkm/tkm]								⇒	⇒									
	Direct Traffic Impacts	10	Travel time [min]								⇗	⇗									
		11	Travel distance [km]																		
		12	Out of pocket costs [EUR/vkm]								⇗	⇗									
		13	Other cost components [EUR/vkm]																		
		14	Qualitative effects (e.g. liability, ...)																		
		15	Comments																		
	Direct Economical Impacts	16	Economic growth [gdp]																	⇒	
		17	Employment [#employed]																	⇒	
		18	Resources: Energy																		
		19	Resources: Material																		
		20	Other																		
		21	Comments																		
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]		⇘	⇘			⇒												
		23	Other																		
		24	Comments																		
	Direct Environmental Impacts	25	GHG emissions [g/vkm]																		
		26	(Local) air pollution [g/vkm]																		
		27	Other																		
		28	Comments																		

C	TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
		29	HT Modules addressed by TPM	✗	✗	✗	✓	✓	✗	✓
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	n/a						
		33	Freight Demand	p_fd_speed (to model travel time changes)						
		34	Vehicle Stock	i_vs_nf_rof_cst_labo (labour cost truck driver)						
		35	Environment	n/a						
		36	Safety	i_sa_speed_truck, i_sa_fatigue_truck						
		37	Comments							
		47	References	Assist fact sheet no. 21						
		48	Performed by	TML						

1.1.8 Safety Systems for Road Vehicle Users (33)

Section A			
	0	Policy name	Safety systems for road vehicle users
	1	Policy Area	3 Research and innovation
	2	Policy Category	Research and innovation
	3	Policy Subcategory	3.2.1 Transport safety
	4	Transport Policy Measure	The policy is set to simulate the diffusion of a variety of technical safety systems in road vehicles such as driver assistance systems, seat belt reminder, eCall and vehicle-infrastructure interface.
	5	Main Targets	Road accidents cause huge economic and human costs to society. Reducing the number of fatalities and injuries is one of the priority actions of the European Commission. Furthermore, technical safety systems can help optimising traffic flows and reduce the risk of congestion.
	6	White Paper Reference	1.4. Acting on transport safety: saving thousands of lives, i.e. (16) Towards a 'zero-vision' on road safety

B

			Passenger						Freight							Sectoral				
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
Indirect Traffic Impacts	7	Volume [passenger/tons]		⇒	⇒					⇒	⇒									
	8	Transport performance [vkm]		⇒	⇒					⇒	⇒									
	9	Transport performance [pkm/tkm]		⇒	⇒					⇒	⇒									
Direct Traffic Impacts	10	Travel time [min]		⇒	⇒					⇒	⇒									
	11	Travel distance [km]		⇒	⇒					⇒	⇒									
	12	Out of pocket costs [EUR/vkm]																		
	13	Other cost components [EUR/vkm]		⇗	⇗					⇗	⇗									
	14	Qualitative effects (e.g. liability, ...)																		
	15	Comments																		
Direct Economical Impacts	16	Economic growth [gdp]																⇗		
	17	Employment [#employed]																⇗		
	18	Resources: Energy																		
	19	Resources: Material																		
	20	Other																		
	21	Comments																		
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]		⇓	⇓			↘		⇓	⇓				↘					
	23	Other																		
	24	Comments																		
Direct Environmental Impacts	25	GHG emissions [g/vkm]																		
	26	(Local) air pollution [g/vkm]																		
	27	Other																		
	28	Comments																		

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	✗	✗	✗	✗	✓	✗	✓

TPM policy levers		
30	Demography	n/a
31	Economy & Resources	n/a
32	Passenger Demand	n/a
33	Freight Demand	n/a
34	Vehicle Stock	i_vs_nf_cstinsu (insurance costs)
35	Environment	n/a
36	Safety	i_sa_speed_truck, i_sa_speed_car, i_sa_speed_p2w, i_sa_speed_pt, i_p_sa_dui_truck (driving under influence), i_p_sa_dui_car, i_p_sa_dui_p2w, i_p_sa_dui_pt, i_sa_distraction_truck, i_sa_distraction_car, i_sa_distraction_p2w, i_sa_distraction_pt, i_sa_fatigue_truck, i_sa_fatigue_car, i_sa_fatigue_p2w, i_sa_fatigue_pt, i_sa_restraint_truck (belt use & child restraints), i_sa_restraint_car, i_sa_time_med_care_truck (time to adequate medical care), i_sa_time_med_care_car, i_sa_time_med_care_p2w, i_sa_time_med_care_pt, i_sa_veh_defect_truck, i_sa_veh_defect_car, i_sa_veh_defect_p2w, i_sa_veh_defect_pt
37	Comments	
47	References	ASSIST fact sheet no.57
48	Performed by	TML

1.1.9 Road Vehicle Safety Technology Protecting Other Transport Users (37)

Section A		0	Policy name	Road vehicle safety technology protecting other transport users
		1	Policy Area	3 Research and innovation
		2	Policy Category	Research and innovation
		3	Policy Subcategory	3.1.1 Vehicle Technology
		4	Transport Policy Measure	Safer road vehicle technologies for vulnerable users such as pedestrians, cyclists and motorcyclists
		5	Main Targets	Develop new road safety technologies, passive and active focussing on vulnerable transport users (e.g. impact reduction in passenger vehicle, active safety like automatic brakes,...).
		6	White Paper Reference	1. An efficient and integrated mobility system 1.4 Acting on transport safety: saving thousands of lives Initiative 16: Towards a 'zero-vision' on road safety

				Passenger						Freight						
B				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]		⇒	⇒		⇒	⇗							
		8	Transport performance [vkm]		⇒	⇒		⇒	⇗							
		9	Transport performance [pkm/tkm]		⇒	⇒		⇒	⇗							
	Direct Traffic Impacts	10	Travel time [min]													
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]													
		13	Other cost components [EUR/vkm]		⇗	⇗										
		14	Qualitative effects (e.g. liability, ...)													
		15	Comments	Modal split effects on the passenger side based on increased costs are marginal. The freight demand is not affected by this policy. ITS could improve the road efficiency. The technologies described in this policy are focussed on safety mainly in urban areas. This does not have an effect on freight demand itself or the mode choice.												
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other													
		21	Comments													
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]		⇘	⇘		⇘	⇓							
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]		⇒	⇒										
		26	(Local) air pollution [g/vkm]		⇒	⇒										
		27	Other													
		28	Comments													

				Sectoral				
B				Overall	Aggricultural	Industrial	Transport	Other Services
	Direct Economical Impacts	16	Economic growth [gdp]			⇗		
		17	Employment [#employed]			⇗		
		18	Resources: Energy					
		19	Resources: Material					

				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
C	TPM translation	29	HT Modules addressed by TPM	X	X	X	X	✓	X	✓

C	TPM policy levers	30	Demography: n/a
		31	Economy & Resources: n/a
		32	Passenger Demand: n/a
		33	Freight Demand: n/a
		34	Vehicle Stock: i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (car capital costs - technology
		35	Environment: n/a
		36	Safety: i_sa_blind_spot_truck i_sa_speed_p2w i_sa_distraction_p2w (distraction (by device)) i_sa_fatigue_p2w i_sa_veh_defect_p2w i_sa_speed_bike i_sa_distraction_bike (distraction (by device)) i_sa_fatigue_bike i_sa_helmet_bike i_sa_veh_defect_bike
		37	Comments
		47	References: <u>Safety:</u> Bosetti et. Al. (2009) -FINAL REPORT - VOLUME 1 EX-POST EVALUATION OF THE RSAP SPECIFIC CONTRACT DG TREN A2/143-2007 Lot 2 Impact Assessments and Evaluations in the field of transport The preparation of the European Road Safety Action Program 2011-2020 Elvik R., P. Christensen, A. Amundsen (2004): Speed and road accidents. TOI report 740/2004, Oslo, Norway Elvik, R., Vaa, T. (2009). The handbook of road safety measures. Evans, L. (1986): Safety-belt effectiveness: the influence of crash severity and selective recruitment. Accid Anal Prev, 18:229–41. Phan, V. et al. (2009). Rider / Driver behaviours and road safety for PTW, 2BeSafe D1. EC FP7 project DaCoTA deliverables, fact sheets and statistics (http://safetyknowsys.swov.nl) ETAC European Truck Accident Causation study Maids, In-depth investigations of accidents involving powered two wheelers CADAS Database
		48	Performed by: TML

1.1.10 Harmonisation of Rail Safety (42)

Section			
A	0	Policy name	Harmonisation of rail safety
	1	Policy Area	4 Efficiency standards and flanking measures
	2	Policy Category	Internal market
	3	Policy Subcategory	4.1.1 Transport safety standards
	4	Transport Policy Measure	Progressively achieve a sector-wide approach to safety certification in the rail transport sector, building on existing approaches for infrastructure managers and railways undertakings and evaluating the possibility to rely on a European standard. Enhance the role of ERA in the field of rail safety, in particular its supervision on national safety measures taken by National Safety Authorities and their progressive harmonisation.
	5	Main Targets	Improve penetration of ERTMS and further develop the technology; harmonize training; develop EU certification. Strengthen internal market for rail freight
	6	White Paper Reference	1. An efficient and integrated mobility system 1.4 Acting on transport safety: saving thousands of lives Initiative 19: Rail safety

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]	⇒						⇒		⇒		⇒		
		8	Transport performance [vkm]	⇒						⇒		⇒		⇒		
		9	Transport performance [pkm/tkm]	⇒						⇒		⇒		⇒		
	Direct Traffic Impacts	10	Travel time [min]													
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]													
		13	Other cost components [EUR/vkm]	⇒						⇒						
		14	Qualitative effects (e.g. liability, ...)													
		15	Comments	The measure standardises the approach to safety certification and therefore is expected to have a marginal effect on costs and operations. Harmonisation decreases border burden and enhances competition while investments into safety increases cost. Only slight impact on passenger rail assumed as these are still domestic markets, not affected as strongly as freight.												
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other													
		21	Comments	Assuming the total demand for transport increase despite of modal shift.												
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]	⇘						⇘						
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]							⇘						
		26	(Local) air pollution [g/vkm]							⇘						
		27	Other													
		28	Comments	May increase the applicablity of electic rail for cross-border transport												

				Sectoral				
				Overall	Aggricultural	Industrial	Transport	Other Services
B	Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇗	⇒
		17	Employment [#employed]	⇒	⇒	⇒	⇗	⇒
		18	Resources: Energy					
		19	Resources: Material					

C	TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
		29	HT Modules addressed by TPM	X	X	✓	✓	✓	X	✓
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	i_pd_link_time_weight, i_pd_imp_delta_los (level of service)						
		33	Freight Demand	p_fd_wait_time						
		34	Vehicle Stock	i_vs_cap_rpcs_mkt (capital cost with VAT), i_vs_nf_rail_othc (other rail fixed costs)						
		35	Environment	n/a						
		36	Safety	i_sa_osign_staff_error_rail (operating and signalling staff error) i_sa_crew_error_rail (Driver and train crew errors) i_sa_track_staff_error_rail (Track and switch maintenance staff errors) i_sa_stock_fault_rail (rolling stock fault) i_sa_infra_fault_rail i_sa_lc_veh_acc_rail (level-crossing accident with vehicle) i_sa_lc_vuln_acc_rail (level-crossing accident with pedestrian/cyclist) i_sa_trespassing_rail i_sa_platform_acc_rail (accidents with person on platform) i_sa_falling_from_train_rail (passengers falling from train)						
		37	Comments							
		47	References	1. no report yet - http://www.tmleuven.be/project/corridor2/home.htm 2. REORTIENT project D5.1: Strategies for Overcoming Barriers to Interoperability and Seamless Service Provision in the REORIENT Corridor - 2007 (not a public report). 3. No report yet: http://www.tmleuven.be/project/efreight/index.htm Safety: - ERA Annual Safety Performance Reports - Fawler et al. (2012) Prospective study into Harmonised Train Accident Precursors Analysis and Management - Maury Hill and associates, A STUDY OF THE ROLE OF HUMAN FACTORS IN RAILWAY OCCURRENCES AND POSSIBLE MITIGATION STRATEGIES						
		48	Performed by	TML						

1.1.11 Harmonised Handling of Dangerous Goods (44)

Section A

0	Policy name	Harmonized handling of dangerous goods
1	Policy Area	4 Efficiency standards and flanking measures
2	Policy Category	Internal market
3	Policy Subcategory	4.1.1 Transport safety standards
4	Transport Policy Measure	Streamline the rules for the intermodal transport of dangerous goods to ensure interoperability between the different modes rail, road, sss and iww.
5	Main Targets	Harmonisation of dangerous goods directive; ensure same safety (increased) level in all EU Member States; reduce cross-border costs; improve internal market for rail freight
6	White Paper Reference	1. An efficient and integrated mobility system 1.4 Acting on transport safety: saving thousands of lives Initiative 20: Transport of dangerous goods

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]							⇗	⇒	↘		⇗		
	8	Transport performance [vkm]							⇗	⇒	↘		⇗		
	9	Transport performance [pkm/tkm]							⇗	⇒	↘		⇗		
Direct Traffic Impacts	10	Travel time [min]													
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]													
	13	Other cost components [EUR/vkm]							⇗	⇗	⇗		⇗		
	14	Qualitative effects (e.g. liability, …)													
	15	Comments	Limited impact on costs; mainly decrease cross-border burden												

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇒	⇒
	17	Employment [#employed]	⇒	⇒	⇒	⇒	⇒
	18	Resources: Energy					
	19	Resources: Material					
	20	Other					
	21	Comments	Assuming that the total demand of transport would not change obviously, impact at setoral level is not foreseeable.				

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]	⇒		⇒				↘		↘				
	23	Other													
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other													
	28	Comments													

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		Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
TPM translation	29 HT Modules addressed by TPM	✗	✗	✗	✓	✓	✗	✓

TPM policy levers	30 Demography	n/a
	31 Economy & Resources	n/a
	32 Passenger Demand	n/a
	33 Freight Demand	p_fd_wait_time, p_fd_load_time, p_fd_unload_time
	34 Vehicle Stock	i_vs_nf_rof_cst_othr (other operational cost for road freight transport)
	35 Environment	n/a
	36 Safety	i_sa_load_error_truck, i_sa_stock_fault_rail (rolling stock faults), i_sa_fat_risk_sss (fatality risk short sea), i_sa_fat_risk_iww (fatality risk iww)
	37 Comments	Rail becomes more attractive and therefore a higher load factor is expected as well. However, this is not a first order effect.
	47 References	1. no report yet - http://www.tmleuven.be/project/corridor2/home.htm 2. REORTIENT project D5.1: Strategies for Overcoming Barriers to Interoperability and Seamless Service Provision in the REORIENT Corridor - 2007 (not a public report). 3. No report yet: http://www.tmleuven.be/project/efreight/index.htm Safety: ETAC European Truck Accident Causation study Maids, In-depth investigations of accidents involving powered two wheelers Trace - Accident Causation Analysis and the Evaluation of the Safety Benefits of Technologies. CADAS Database
	48 Performed by	TML

1.1.12 European Rail Traffic Management System (56)

Section A			
	0	Policy name	European Rail Traffic Management System
	1	Policy Area	3 Research and innovation
	2	Policy Category	Internal market
	3	Policy Subcategory	3.1.3 Transport information systems, management and service
	4	Transport Policy Measure	European Rail Traffic Management System (ERTMS)
	5	Main Targets	1. Apply the European Train Control System (ETCS), a signalling, control and train protection system designed to replace the many incompatible safety systems currently used by European railways, especially on high-speed lines. 2. GSM-Railway, an international wireless communications standard for railway communication and applications.
	6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.1 A European Transport Research and Innovation Policy Initiative 25: An innovation and deployment strategy

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]	⇗		↘	↘			⇗		↘		⇒		
	8	Transport performance [vkm]	⇗		↘	↘			⇗		↘		⇒		
	9	Transport performance [pkm/tkm]	⇗		↘	↘			⇗		↘		⇒		
Direct Traffic Impacts	10	Travel time [min]	↘						↘						
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]													
	13	Other cost components [EUR/vkm]	⇗						⇗						
	14	Qualitative effects (e.g. liability, ...)	Increased capacity. Higher reliability rates. Simplified approval process for vehicles.												
	15	Comments	ETCS especially improves cross border rail transport, to overcome the frictions caused by different national train signalling and control systems in each country.												

Sectoral				
Overall	Aggricultural	Industrial	Transport	Other Services
⇒	⇒	⇒	⇗	⇒
⇒	⇒	⇒	⇗	⇒

Direct Economical Impacts	16	Economic growth [gdp]	
	17	Employment [#employed]	
	18	Resources: Energy	
	19	Resources: Material	
	20	Other	An opened supply market for purchasing equipment for installation.
	21	Comments	
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]	⇓ ⇓
	23	Other	
	24	Comments	
Direct Environmental Impacts	25	GHG emissions [g/vkm]	
	26	(Local) air pollution [g/vkm]	
	27	Other	
	28	Comments	

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	✗	✗	✓	✓	✓	✗	✓

TPM policy levers		
	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	i_pd_link_time_weight, i_pd_imp_delta_los (level of service)
	33	Freight Demand	p_fd_speed (travel time)
	34	Vehicle Stock	i_vs_cap_rpcs_mkt (vehicle cost with VAT), i_vs_nf_rail_othc (rail non fuel other costs)
	35	Environment	n/a
	36	Safety	i_sa_op_sign_staff_error_rail (Operating and signalling staff errors), i_sa_crew_error_rail (Driver and train crew errors), i_sa_track_staff_error_rail (Track and switch maintenance staff errors)
	37	Comments	
	47	References	http://www.ertms.net/ Safety: - ERA Annual Safety Performance Reports - Fawler et al. (2012) Prospective study into Harmonised Train Accident Precursors Analysis and Management - Maury Hill and associates, A STUDY OF THE ROLE OF HUMAN FACTORS IN RAILWAY OCCURRENCES AND POSSIBLE MITIGATION STRATEGIES
	48	Performed by	MKmetric

1.1.13 River Information System (57)

Section A

0	Policy name	River information system
1	Policy Area	3 Research and innovation
2	Policy Category	Internal market
3	Policy Subcategory	3.1.3 Transport information systems, management and service
4	Transport Policy Measure	Policy set to simulate the development of the River Information Services, assuming an impact on IWW transport time thanks to the reduction of administration burdens and the provision of information exchange for freight transport.
5	Main Targets	Increasing efficiency of IWW transport in term of travecl time
6	White Paper Reference	35. Multimodal freight corridors for sustainable transport networks, i.e. stimulate the integration of inland waterways into the transport system.

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]							⇒		⇒		⇒	⇒	
	8	Transport performance [vkm]							⇒		⇒		⇒	⇒	
	9	Transport performance [pkm/tkm]							⇒		⇒		⇒	⇒	
Direct Traffic Impacts	10	Travel time [min]											⇘		
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]											⇒		
	13	Other cost components [EUR/vkm]													
	14	Qualitative effects (e.g. liability, ...)													
	15	Comments													

		Sectoral				
		Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16 Economic growth [gdp]	⇒	⇒	⇒	⇒	⇒
	17 Employment [#employed]	⇒	⇒	⇒	⇒	⇒
	18 Resources: Energy	⇒	⇒	⇒	⇘	⇒
	19 Resources: Material	⇒	⇒	⇒	⇒	⇒
	20 Other					
	21 Comments					

Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
	23	Other													
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other													
	28	Comments													

C

		Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
TPM translation	29 HT Modules addressed by TPM	X	X	X	✓	✓	X	X

TPM policy levers	30 Demography	n/a
	31 Economy & Resources	n/a
	32 Passenger Demand	n/a
	33 Freight Demand	p_fd_wait_time, p_fd_load_time, p_fd_unload_time, p_fd_fixed_cost,
	34 Vehicle Stock	i_vs_cstiww (IWW costs)
	35 Environment	n/a
	36 Safety	n/a
	37 Comments	
	47 References	ASSIST fact sheet no.25.
	48 Performed by	TML

1.1.14 Intelligent Traffic Information System for Road (58.1)

Section A

0	Policy name	Intelligent traffic information system for road
1	Policy Area	3 Research and innovation / 6. Infrastructure
2	Policy Category	Research and innovation
3	Policy Subcategory	3.1.3 Transport information systems, management and service
4	Transport Policy Measure	Deployment of next generation of road traffic management and information systems
5	Main Targets	Provision of innovative services relating to different road vehicles and traffic management and enable various users to be better informed (RTTI - real time traffic and travel information) and make safer, more coordinated, and 'smarter' use of transport networks. Intelligent Transport information and communication Systems (ITS) cover a wide field with three main streams to be considered. The first deals with real time traffic information systems (58.1). The second concenrs dynamic traffic managemen (58.2), and the third Intelligent vehicles, including driver assistence (58.3).
6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.1 A European Transport Research and Innovation Policy Initiative 25: An innovation and deployment strategy

B

			Passenger						Freight							
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	8	Transport performance [vkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	9	Transport performance [pkm/tkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
Direct Traffic Impacts	10	Travel time [min]		⇒	↘		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	11	Travel distance [km]		⇒	⇒						⇒				
	12	Out of pocket costs [EUR/vkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	13	Other cost components [EUR/vkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	14	Qualitative effects (e.g. liability, ...)	Less congestion on road.												
	15	Comments	58.1 Is about Traffic Information Systems - DRIP, GRIPS, etc. The effect is better informed traffic, which leads to better choices in terms of departure time, route choice. Ceteris paribus, modal share of the respective transport mode might only be affected to which ITS is applied to. The initiative is about setting the framework of efficient deployment of innovation in all modes. The effects depend on the extent and the timing of the actual deployment .												
Direct Economical Impacts	16	Economic growth [gdp]													
	17	Employment [#employed]													
	18	Resources: Energy													
	19	Resources: Material													
	20	Other	Costs for health service and insurance costs decrease. Implementation and operation costs for providers apply. The ECR module might not able to capture these impact.												
	21	Comments	No obvious impact expected.												
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]		⇒	⇒					⇒	⇒				
	23	Other	Increase of well-being for residents in urban areas or near highly polluted roads apply.												
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other	Reduced noise												
	28	Comments	Less emissions in road transport through avoided congestions might be compensated by mode shift towards road												

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇒	⇒
	17	Employment [#employed]	⇒	⇒	⇒	⇒	⇒
	18	Resources: Energy	⇒	⇒	⇒	↘	⇒
	19	Resources: Material	⇒	⇒	⇒	⇒	⇒

C

			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
TPM translation	29	HT Modules addressed by TPM	✗	✗	✓	✓	✓	✗	✗

TPM policy levers	30	Demography: n/a
	31	Economy & Resources: n/a
	32	Passenger Demand: i_pd_link_time_weight, i_pd_imp_delta_los (level of service)
	33	Freight Demand: p_fd_speed
	34	Vehicle Stock: i_vs_cap_tech (tech related vehicle capital costs)
	35	Environment: n/a
	36	Safety: n/a
	37	Comments
	47	References
	48	Performed by: MKmetric

References:

ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet No. 19.

Safety:
Bosetti et. Al. (2009) -FINAL REPORT - VOLUME 1
EX-POST EVALUATION OF THE RSAP SPECIFIC CONTRACT DG TREN A2/143-2007 Lot 2 Impact Assessments and Evaluations in the field of transport The preparation of the European Road Safety Action Program 2011-2020
Elvik R., P. Christensen, A. Amundsen (2004): Speed and road accidents. TOI report 740/2004, Oslo, Norway
Elvik, R., Vaa, T. (2009). The handbook of road safety measures.
Phan, V. et al. (2009). Rider / Driver behaviours and road safety for PTW, 2BeSafe D1.
EC FP7 project DaCoTA deliverables, fact sheets and statistics (http://safetyknowsys.swov.nl)
ETAC European Truck Accident Causation study
Maids, In-depth investigations of accidents involving powered two wheelers
Action plan and legal framework for the deployment of intelligent transport systems (ITS) in Europe
Trace - Accident Causation Analysis and the Evaluation of the Safety Benefits of Technologies.
CADAS Database

1.1.15 Dynamic Traffic Management for Road (58.2)

Section A

0	Policy name	Dynamic traffic management for road
1	Policy Area	3 Research and innovation / 6. Infrastructure
2	Policy Category	Research and innovation
3	Policy Subcategory	3.1.3 Transport information systems, management and service
4	Transport Policy Measure	Deployment of next generation of road traffic management and information systems
5	Main Targets	Provision of innovative services relating to different road vehicles and traffic management and enable various users to be better informed (RTTI - real time traffic and travel information) and make safer, more coordinated, and 'smarter' use of transport networks. Transport Information Systems (ITS) cover a wide field with three main streams to be considered. The first deals with real time traffic information systems (58.1). The second concenrs dynamic traffic management (58.2), and the third Intelligent vehicles, including driver assistence (58.3).
6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.1 A European Transport Research and Innovation Policy Initiative 25: An innovation and deployment strategy

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	8	Transport performance [vkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	9	Transport performance [pkm/tkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
Direct Traffic Impacts	10	Travel time [min]		⇒	↘		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	11	Travel distance [km]		⇒	⇒						⇒				
	12	Out of pocket costs [EUR/vkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	13	Other cost components [EUR/vkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	14	Qualitative effects (e.g. liability, …)	Less congestion and accidents on road, increased comfort for travellers.												
	15	Comments	58.2 is about Dynamic Traffic Management, such as onramp metering, coordinated metering, homogenisation, etc. This has a direct effect on the traffic. Ceteris paribus, modal share of the respective transport mode might only be affected to which ITS is applied to. The initiative is about setting the framework of efficient deployment of innovation in all modes. The effects depend on the extent and the timing of the actual deployment.												

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Traffic Impacts	14	Qualitative effects (e.g. liability, …)					
	15	Comments					
Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇒	⇒
	17	Employment [#employed]	⇒	⇒	⇒	⇒	⇒
	18	Resources: Energy	⇒	⇒	⇒	↘	⇒
	19	Resources: Material	⇒	⇒	⇒	⇒	⇒
	20	Other	Costs for health service and insurance costs decrease. Implementation and operation costs for providers apply. The ECR module might not able to capture these impact.				
	21	Comments	No obvious impact expected.				

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]		↘	↘					↘	↘				
	23	Other	Increase of well-being for residents in urban areas or near highly polluted roads apply.												
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other	Reduced noise												
	28	Comments	Less emissions in road transport through avoided congestions might be compensated by mode shift towards road												

C

			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
TPM translation	29	HT Modules addressed by TPM	✗	✗	✓	✓	✓	✗	✗

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	i_pd_link_time_weight, i_pd_imp_delta_los (level of service)
	33	Freight Demand	p_fd_speed
	34	Vehicle Stock	i_vs_cap_tech (tech related vehicle capital costs)
	35	Environment	n/a
	36	Safety	n/a
	37	Comments	
	47	References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet No. 19. Safety: Bosetti et. Al. (2009) -FINAL REPORT - VOLUME 1 EX-POST EVALUATION OF THE RSAP SPECIFIC CONTRACT DG TREN A2/143-2007 Lot 2 Impact Assessments and Evaluations in the field of transport The preparation of the European Road Safety Action Program 2011-2020 Elvik R., P. Christensen, A. Amundsen (2004): Speed and road accidents. TOI report 740/2004, Oslo, Norway Elvik, R., Vaa, T. (2009). The handbook of road safety measures. Phan, V. et al. (2009). Rider / Driver behaviours and road safety for PTW, 2BeSafe D1. EC FP7 project DaCoTA deliverables, fact sheets and statistics (http://safetyknowsys.swov.nl) ETAC European Truck Accident Causation study Maids, In-depth investigations of accidents involving powered two wheelers Action plan and legal framework for the deployment of intelligent transport systems (ITS) in Europe Trace - Accident Causation Analysis and the Evaluation of the Safety Benefits of Technologies. CADAS Database
	48	Performed by	MKmetric

1.1.16 Intelligent Road Vehicles (58.3)

Section				
A	0	Policy name	Intelligent road vehicles	
	1	Policy Area	3 Research and innovation / 6. Infrastructure	
	2	Policy Category	Research and innovation	
	3	Policy Subcategory	3.1.3 Transport information systems, management and service	
	4	Transport Policy Measure	Deployment of next generation of road traffic management and information systems	
	5	Main Targets	Provision of innovative services relating to different road vehicles and traffic management and enable various users to be better informed (RTTI - real time traffic and travel information) and make safer, more coordinated, and 'smarter' use of transport networks. Transport Information Systems (ITS) cover a wide field with three main streams to be considered. The first deals with real time traffic information systems (58.1). The second concenrs dynamic traffic managemen (58.2), and the third Intelligent vehicles, including driver assistence (58.3).	
	6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.1 A European Transport Research and Innovation Policy Initiative 25: An innovation and deployment strategy	

B				Passenger						Freight							
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
		8	Transport performance [vkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
		9	Transport performance [pkm/tkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
	Direct Traffic Impacts	10	Travel time [min]		⇒	↘		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
		11	Travel distance [km]		⇒	⇒						⇒				
		12	Out of pocket costs [EUR/vkm]		⇒	⇒		⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒
		13	Other cost components [EUR/vkm]		⇗	⇗		⇗		⇗	⇗	⇗	⇗	⇗	⇗	⇗
		14	Qualitative effects (e.g. liability, ...)	Less congestion and accidents on road, increased comfort for travellers.												
		15	Comments	58.3 is about intelligent vehicles, driver assistance, cooperative systems, connected driving. The vehicle is progressively taken over by the computer, leading to safer driving, to less congestion, to higher road capacity. Ceteris paribus, modal share of the respective transport mode might only be affected to which ITS is applied to. The initiative is about setting the framework of efficient deployment of innovation in all modes. The effects depend on the extent and the timing of the actual deployment .											
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other	Costs for health service and insurance costs decrease. Implementation and operation costs for providers apply. The ECR module might not able to capture these impact.												
		21	Comments	No obvious impact expected.												
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]		↘	⇓					↘	⇓				
		23	Other	Increase of well-being for residents in urban areas or near highly polluted roads apply.												
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]													
		26	(Local) air pollution [g/vkm]													
		27	Other	Reduced noise												
		28	Comments	Less emissions in road transport through avoided congestions might be compensated by mode shift towards road												

				Sectoral				
				Overall	Aggricultural	Industrial	Transport	Other Services
B	Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇒	⇒
		17	Employment [#employed]	⇒	⇒	⇒	⇒	⇒
		18	Resources: Energy	⇒	⇒	⇒	↘	⇒
		19	Resources: Material	⇒	⇒	⇒	⇒	⇒

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	✗	✗	✓	✓	✓	✗	✓
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	i_pd_link_time_weight, i_pd_imp_delta_los (level of service)						
		33	Freight Demand	p_fd_speed						
		34	Vehicle Stock	i_vs_cap_tech (tech related vehicle capital costs)						
		35	Environment	n/a						
		36	Safety	i_sa_speed_car, i_sa_time_med_care_car (time to adequate medical care), i_sa_speed_truck, i_sa_time_med_care_truck (time to adequate medical care), i_sa_speed_p2w, i_sa_time_med_care_p2w (time to adequate medical care), i_sa_speed_pt, i_sa_time_med_care_pt (time to adequate medical care), i_sa_speed_bike, i_sa_time_med_care_bike (time to adequate medical care)						
		37	Comments							
		47	References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet No. 19. Safety: Bosetti et. Al. (2009) -FINAL REPORT - VOLUME 1 EX-POST EVALUATION OF THE RSAP SPECIFIC CONTRACT DG TREN A2/143-2007 Lot 2 Impact Assessments and Evaluations in the field of transport The preparation of the European Road Safety Action Program 2011-2020 Elvik R., P. Christensen, A. Amundsen (2004): Speed and road accidents. TOI report 740/2004, Oslo, Norway Elvik, R., Vaa, T. (2009). The handbook of road safety measures. Phan, V. et al. (2009). Rider / Driver behaviours and road safety for PTW, 2BeSafe D1. EC FP7 project DaCoTA deliverables, fact sheets and statistics (http://safetyknowsys.swov.nl) ETAC European Truck Accident Causation study Maids, In-depth investigations of accidents involving powered two wheelers Action plan and legal framework for the deployment of intelligent transport systems (ITS) in Europe Trace - Accident Causation Analysis and the Evaluation of the Safety Benefits of Technologies. CADAS Database						
		48	Performed by	MKmetric						

1.1.17 Replacement of Inefficient Cars (63.1)

Section A

0	Policy name	Replacement of inefficient cars
1	Policy Area	3 Research and innovation
2	Policy Category	Efficiency standards and flanking measures
3	Policy Subcategory	3.2.2 Promotion and incentives
4	Transport Policy Measure	The policy is set in order to stimulate the replacement of inefficient and polluting vehicles in the European car vehicle fleet.
5	Main Targets	Reducing CO2, fuel use and pollution from road transport (car fleet)
6	White Paper Reference	25. An innovation and deployment strategy, i.e. measures to promote increased replacement rate of inefficient and polluting vehicles

B

			Passenger						Freight							Sectoral				
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
Indirect Traffic Impacts	7	Volume [passenger/tons]																		
	8	Transport performance [vkm]	⇒	↘	↘		⇒	⇒												
	9	Transport performance [pkm/tkm]		⇒	⇒		⇒	⇒												
Direct Traffic Impacts	10	Travel time [min]																		
	11	Travel distance [km]																		
	12	Out of pocket costs [EUR/vkm]		⇗	⇗															
	13	Other cost components [EUR/vkm]																		
	14	Qualitative effects (e.g. liability, ...)																		
	15	Comments																		
Direct Economical Impacts	16	Economic growth [gdp]																⇒	⇒	
	17	Employment [#employed]																		
	18	Resources: Energy																⇒	⇒	
	19	Resources: Material																		
	20	Other																		
	21	Comments																		
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																		
	23	Other																		
	24	Comments																		
Direct Environmental Impacts	25	GHG emissions [g/vkm]		↘	↘															
	26	(Local) air pollution [g/vkm]		↘	↘															
	27	Other																		
	28	Comments																		

C

		TPM translation	Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	✗	✗	✗	✗	✓	✓	✗

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	n/a
	33	Freight Demand	n/a
	34	Vehicle Stock	i_vs_veh_stock (fleet portfolio), i_vs_cap_rpcs_mkt (vehicle cost with VAT), i_vs_cap_tech (vehicle capital costs)
	35	Environment	i_ev_emfactor (emission and/or fuel consumption
	36	Safety	n/a
	37	Comments	See as well TPM 92 New vehicles.
	47	References	Nemry et al. Feebate and scrappage policy instrument. European Commission, Joint Research Centre 2009. Global Insight, Assessment of the effectiveness of scrapping schemes for vehicles: economic, environmental, and safety impacts, Final Report for DG Entreprise and Industry, March
	48	Performed by	TML

1.1.18 Diffusion of Electro Cars (63.2)

Section				
A		0	Policy name	Diffusion of electro cars
		1	Policy Area	3 Research and innovation
		2	Policy Category	Efficiency standards and flanking measures
		3	Policy Subcategory	3.2.2 Promotion and incentives
		4	Transport Policy Measure	Electromobility road measures to promote increased replacement rate of inefficient and polluting vehicles. The policy is set in order to accelerate the diffusion of vehicles with electric propulsion in the European car vehicle fleet.
		5	Main Targets	Reducing fuel use, CO2 emission and pollution from road transport
		6	White Paper Reference	25. An innovation and deployment strategy

B				Passenger						Freight							Sectoral				
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
	Indirect Traffic Impacts	7	Volume [passenger/tons]																		
		8	Transport performance [vkm]	⇒	↘	↘		⇒	⇒												
		9	Transport performance [pkm/tkm]		⇒	⇒		⇒	⇒												
	Direct Traffic Impacts	10	Travel time [min]																		
		11	Travel distance [km]																		
		12	Out of pocket costs [EUR/vkm]		⇗	⇗															
		13	Other cost components [EUR/vkm]																		
		14	Qualitative effects (e.g. liability, ...)																		
		15	Comments																		
	Direct Economical Impacts	16	Economic growth [gdp]																⇒	⇒	
		17	Employment [#employed]																		
		18	Resources: Energy																⇒	⇒	
		19	Resources: Material																		
		20	Other																		
		21	Comments																		
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																		
		23	Other																		
		24	Comments																		
	Direct Environmental Impacts	25	GHG emissions [g/vkm]		↘	↘															
		26	(Local) air pollution [g/vkm]		↘	↘															
		27	Other																		
		28	Comments																		

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	✗	✗	✗	✗	✓	✓	✗
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	n/a						
		33	Freight Demand	n/a						
		34	Vehicle Stock	i_vs_veh_stock (fleet portfolio), i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (vehicle capital costs)						
		35	Environment	i_ev_emfactor (emission and/or fuel consumption						
		36	Safety	n/a						
		37	Comments	See as well TPM 51 New Fuels.						
		47	References	ASSIST fact sheet no. 50.						
		48	Performed by	TML						

1.1.19 Diffusion of H_2 Fuel Cell Cars (63.3)

Section				
A		0	Policy name	Diffusion of H2 fuel cell cars
		1	Policy Area	3 Research and innovation
		2	Policy Category	Efficiency standards and flanking measures
		3	Policy Subcategory	3.2.2 Promotion and incentives
		4	Transport Policy Measure	H2 Fuel Cell vehicle measures to promote increased replacement rate of inefficient and polluting vehicles. The policy is set in order to stimulate the diffusion of H2 fuel cell vehicles in the European car vehicle fleet.
		5	Main Targets	
		6	White Paper Reference	25. An innovation and deployment strategy

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]													
		8	Transport performance [vkm]	⇒	↘	↘		⇒	⇒							
		9	Transport performance [pkm/tkm]		⇒	⇒		⇒	⇒							
	Direct Traffic Impacts	10	Travel time [min]													
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]		⇗	⇗										
		13	Other cost components [EUR/vkm]													
		14	Qualitative effects (e.g. liability, ...)													
		15	Comments													

				Sectoral				
				Overall	Aggricultural	Industrial	Transport	Other Services
	Direct Economical Impacts	16	Economic growth [gdp]			⇒	⇒	
		17	Employment [#employed]					
		18	Resources: Energy			⇒	⇒	
		19	Resources: Material					
		20	Other					
		21	Comments					
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]					
		23	Other					
		24	Comments					
	Direct Environmental Impacts	25	GHG emissions [g/vkm]					
		26	(Local) air pollution [g/vkm]					
		27	Other					
		28	Comments					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	X	X	X	X	✓	X	X

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	n/a
	33	Freight Demand	n/a
	34	Vehicle Stock	i_vs_veh_stock (fleet portfolio), i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (vehicle capital costs)
	35	Environment	i_ev_emfactor (emission and/or fuel consumption
	36	Safety	n/a
	37	Comments	See as well TPM 51 New Fuels.
	47	References	ASSIST fact sheet no. 51.
	48	Performed by	TML

1.1.20 LDV Speed Limit (78)

Section A

0	Policy name	LDV speed limit
1	Policy Area	4 Efficiency standards and flanking measures
2	Policy Category	Efficiency standards and flanking measures
3	Policy Subcategory	4.1.1 Transport safety standards
4	Transport Policy Measure	Examine approaches to limit the maximum speed of light commercial road vehicles (LDV), in order to decrease energy consumption, to enhance road safety and to ensure a level playing field.
5	Main Targets	Improve safety, decrease energy consumption and ensure level playing field.
6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.2 Promoting more sustainable behaviour Initiative 30: Eco-driving and Speed limits

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]							⇒	⇘	⇒				
	8	Transport performance [vkm]							⇒	⇘	⇒				
	9	Transport performance [pkm/tkm]							⇒	⇘	⇒				
Direct Traffic Impacts	10	Travel time [min]								⇗					
	11	Travel distance [km]								⇗					
	12	Out of pocket costs [EUR/vkm]								⇗					
	13	Other cost components [EUR/vkm]													
	14	Qualitative effects (e.g. liability, …)													
	15	Comments	This policy will mainly affect urban freight transport; the LDV will be used in the city and for transportation from and to the city. This could increase the travelled distance and consequently the transport performance. Fuel costs might decrease however longer travel times increase driver costs, travel costs... Potential effects on passenger road transport are expected to be marginal for inter zonal traffic. LDV will concentrate with HDV on the right lanes.												
Direct Economical Impacts	16	Economic growth [gdp]													
	17	Employment [#employed]													
	18	Resources: Energy													
	19	Resources: Material													
	20	Other													
	21	Comments													
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]		⇗			⇒	⇑		⇑					
	23	Other													
	24	Comments	Speed of LDV affects in the first place the safety of this category. Other categories (person cars, slow modes, etc.) have a smaller safety benefit from other road users (in this case LDV) being slower and safer. For pedestrians (and probably cyclists as well), we aim to include such an effect in HIGH-TOOL. For other modes, this effect is more negligible and beyond the modelling scope of the HIGH-TOOL safety module.												
Direct Environmental Impacts	25	GHG emissions [g/vkm]		⇘						⇓					
	26	(Local) air pollution [g/vkm]		⇘						⇓					
	27	Other													
	28	Comments													

Sectoral				
Overall	Aggricultural	Industrial	Transport	Other Services
⇘			⇘	

C

			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
TPM translation	29	HT Modules addressed by TPM	X	X	X	✓	X	X	✓

TPM policy levers	30	Demography: n/a
	31	Economy & Resources: n/a
	32	Passenger Demand: n/a
	33	Freight Demand: p_fd_speed, i_fd_imp_dist (distance)
	34	Vehicle Stock: n/a
	35	Environment: n/a
	36	Safety: i_sa_speed_truck
	37	Comments: Changes to costs only apply to intra-zonal costs (urban)
	47	References: Logghe S. et al. (2006) - Doorrekening met behulp van het TREMOVE model van de maatregel "80 km/u voor vrachtwagens. (TML-Leuven) - Dutch only Safety: Bosetti et. Al. (2009) -FINAL REPORT - VOLUME 1 EX-POST EVALUATION OF THE RSAP SPECIFIC CONTRACT DG TREN A2/143-2007 Lot 2 Impact Assessments and Evaluations in the field of transport The preparation of the European Road Safety Action Program 2011-2020 Elvik R., P. Christensen, A. Amundsen (2004): Speed and road accidents. TOI report 740/2004, Oslo, Norway Safety: Elvik, R., Vaa, T. (2009). The handbook of road safety measures. EC FP7 project DaCoTA deliverables, fact sheets and statistics (http://safetyknowsys.swov.nl) ETAC European Truck Accident Causation study CADAS Database
	48	Performed by: TML

1.1.21 Urban Road Charging (81)

Section A

0	Policy name	Urban road charging
1	Policy Area	1 Pricing
2	Policy Category	Pricing
3	Policy Subcategory	1.1 Infrastructure charging / access restrictions schemes
4	Transport Policy Measure	Urban Area charging / Cordon pricing
5	Main Targets	Develop a validated framework for urban road user charging and access restriction schemes and their applications, including a legal and validated operational and technical framework covering vehicle and infrastructure applications.
6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.3 Integrated urban mobility Initiative 32: An EU framework for urban road user charging

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]			↘		⇗	⇗			⇒				
	8	Transport performance [vkm]			↘		⇗	⇗			⇒				
	9	Transport performance [pkm/tkm]			↘		⇗	⇗			⇒				
Direct Traffic Impacts	10	Travel time [min]													
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]			⇗		⇒				⇗				
	13	Other cost components [EUR/vkm]													
	14	Qualitative effects (e.g. liability, ...)													
	15	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	↘	⇒
	17	Employment [#employed]	⇒	⇒	⇒	↘	⇒
	18	Resources: Energy	⇒			↘	
	19	Resources: Material					
	20	Other					
	21	Comments					
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]					
	23	Other					
	24	Comments	Road safety is not necessarily improving as the travel speeds are likely to increase.				
Direct Environmental Impacts	25	GHG emissions [g/vkm]					
	26	(Local) air pollution [g/vkm]					
	27	Other					
	28	Comments					

C

		TPM translation	Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	X	✓	✓	X	X	X

		TPM policy levers	
	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	i_pd_urban_dutoll
	33	Freight Demand	p_fd_load_factor, p_fd_speed (intra-zonal), i_fd_toll_cost
	34	Vehicle Stock	n/a
	35	Environment	n/a
	36	Safety	n/a
	37	Comments	This policy needs separate scenarios: will the policy result in distribution centres outside of urban areas, etc.? --> Road charging schemes for urban areas could include both the size and the fuel technology; for example, fees could be charged on HDVs (non-electric). This could promote the use of UCCs and therefore decrease the load factor --> Access restriction schemes could be translated into low emission zones, low-noise windows for trucks etc. A clear description of the policy is needed to address the right policy measure: in case of road charging schemes one may add only toll fees whereas in access restriction schemes a shift from HDVs to LDVs is expected and therefore a decrease in load factors, increase in kms travelled and travel times...
	47	References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet 1 (Kritzinger et al., 2013).
	48	Performed by	KIT

1.1.22 HDV Limitation for Urban Areas (83)

Section A			
	0	Policy name	HDV limitation for urban areas
	1	Policy Area	7 Transport Planning
	2	Policy Category	Efficinecy standards and flanking measures
	3	Policy Subcategory	7.2.4 Urban logistics strategies
	4	Transport Policy Measure	The City Logistics policy includes various measures regarding urban freight distribution (e.g. urban consolidation centers) aimed at reducing the traffic of heavy duty vehicles (HDV) through cities and metropolitan areas by means of the implementation of technical and planning measures.
	5	Main Targets	The activation of this measure corresponds to the implementation of an increment of the average load factor of HDVs and of the average load factor of LDVs. The latter increment is expected to be larger than the former as the measure is focused on local distribution where light vehicles are predominantly used.
	6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.3 Integrated urban mobility A strategy for near- 'zero-emission urban logistics' 2030

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]													
	8	Transport performance [vkm]								⇓					
	9	Transport performance [pkm/tkm]								⇓					
Direct Traffic Impacts	10	Travel time [min]		↘			↘			↘					
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]													
	13	Other cost components [EUR/vkm]								↘					
	14	Qualitative effects (e.g. liability, …)													
	15	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]	⇗			⇗	
	17	Employment [#employed]					
	18	Resources: Energy					
	19	Resources: Material					
	20	Other					
	21	Comments					

Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
	23	Other													
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other													
	28	Comments													

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	X	X	✓	✓	X	X

TPM policy levers		
	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	n/a
	33	Freight Demand	p_fd_load_factor (for intra-zonal flows)
	34	Vehicle Stock	i_vs_nf_rof_cst_othr (other non-fuel operational costs for freight road transport)
	35	Environment	n/a
	36	Safety	n/a
	37	Comments	
	47	References	ASSIST fact sheet no. 47.
	48	Performed by	KIT

1.1.23 Replacement of Inefficient LDVs and Buses (84)

Section A

0	Policy name	Replacement of inefficient LDVs and buses
1	Policy Area	4 Efficiency standards and flanking measures / 7 Transport planning
2	Policy Category	Efficinecy standards and flanking measures
3	Policy Subcategory	4.2.1 Promotion, information, dialogue 7.2.4 Urban logistics strategies
4	Transport Policy Measure	The policy is set to stimulate purchasing clean and energy-efficient commercial vehicles (LDV and buses) at urban level.
5	Main Targets	The activation of this measure corresponds to two changes. The first change is a reduction of average fuel consumption of LDVs and buses in the local distance band. The second change is an increase of the share of electric LDV which will be achieved by increasing the preferences in the logit function estimating the probability of a decision for an battery-electric LDV and buses.
6	White Paper Reference	2.3. Integrated urban mobility, i.e. (33)A strategy for near-'zero-emission urban logistics' 2030

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]	⇗	↘						↘					
	8	Transport performance [vkm]	⇗	↘						↘					
	9	Transport performance [pkm/tkm]	⇗	↘						↘					
Direct Traffic Impacts	10	Travel time [min]													
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]		⇗						⇗					
	13	Other cost components [EUR/vkm]													
	14	Qualitative effects (e.g. liability, ...)													
	15	Comments													

	Sectoral				
	Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts					
16 Economic growth [gdp]			⇛	⇛	
17 Employment [#employed]					
18 Resources: Energy				⇛	
19 Resources: Material					
20 Other					
21 Comments					

Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
	23	Other													
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]		⇛						⇛					
	26	(Local) air pollution [g/vkm]		↘						↘					
	27	Other													
	28	Comments													

C

TPM translation		Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29 HT Modules addressed by TPM	✗	✓	✗	✓	✓	✓	✗

TPM policy levers		
30	Demography	n/a
31	Economy & Resources	i_er_delta_inv
32	Passenger Demand	n/a
33	Freight Demand	p_fd_load_factor (intra-zonal), p_fd_load_capacity
34	Vehicle Stock	i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (technology related vehicle capital costs)
35	Environment	i_ev_emfactors (emission and/or fuel consumption factors)
36	Safety	n/a
37	Comments	
47	References	ASSIST fact shet no. 46.
48	Performed by	TML

1.1.24 Acceleration of TEN-T Implementation (86)

Section				
A		0	Policy name	Accelaration of TEN-T implementation
		1	Policy Area	6 Infrastructure
		2	Policy Category	Internal market
		3	Policy Subcategory	6.1 European TEN-T core network
		4	Transport Policy Measure	Policy set to simulate an accelerated implementation of TEN-T projects, under the assumptions that the Core TEN Network will be completed by the year 2025 and the Comprehensive TEN Network by the year 2040.
		5	Main Targets	The activation of this measure corresponds to apply a predefined reduction of travel time on all O/D pairs connected by routes passing through zones where new links are built plus
		6	White Paper Reference	

B				Passenger						Freight							Sectoral				
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
	Indirect Traffic Impacts	7	Volume [passenger/tons]																		
		8	Transport performance [vkm]	⇗		⇗				⇗		⇗		⇗							
		9	Transport performance [pkm/tkm]	⇗		⇗				⇗		⇗		⇗							
	Direct Traffic Impacts	10	Travel time [min]	⇘		⇘				⇘		⇘		⇘							
		11	Travel distance [km]	⇗		⇗				⇒		⇒		⇒							
		12	Out of pocket costs [EUR/vkm]																		
		13	Other cost components [EUR/vkm]							⇘		⇘		⇘							
		14	Qualitative effects (e.g. liability, ...)																		
		15	Comments																		
	Direct Economical Impacts	16	Economic growth [gdp]																		
		17	Employment [#employed]														⇗			⇗	
		18	Resources: Energy																		
		19	Resources: Material																		
		20	Other																		
		21	Comments																		
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																		
		23	Other																		
		24	Comments																		
	Direct Environmental Impacts	25	GHG emissions [g/vkm]																		
		26	(Local) air pollution [g/vkm]																		
		27	Other																		
		28	Comments																		

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	✗	✓	✓	✓	✓	✗	✗
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	i_er_delta_inf_inv						
		32	Passenger Demand	i_pd_imp_time, i_pd_imp_dist, i_pd_core_toll_cost						
		33	Freight Demand	p_fd_speed (travel time), p_fd_wait_time, p_fd_load_time, p_fd_unload_time						
		34	Vehicle Stock	i_vs_nf_rof_cst_othr (other non-fuel operational costs for freight road transport)						
		35	Environment	n/a						
		36	Safety	n/a						
		37	Comments	TEN_T implementation is interpreted by increaseing infrastructure costs through e.g. TOLL Cost. This will affect directly the demand modules dealing directly with the network. The vehicle stock module will take only demand (vkm) from the demand modules which already include the effects of the implementation of e.g. TOLL Cost.						
		47	References	ASSIST fact sheet no. 13 (14 + 15)						
		48	Performed by	KIT						

1.1.25 Deployment of Efficient Vehicles (92)

Section			
A	0	Policy name	Deployment of efficient vehicles
	1	Policy Area	3 Research and innovation
	2	Policy Category	Efficiency standards and flanking measures
	3	Policy Subcategory	3.1.1 Vehicle Technology
	4	Transport Policy Measure	Support the deployment of new vehicles and vessels and retrofitting.
	5	Main Targets	Improve the environmental and safety performance of existing transport material.
	6	White Paper Reference	3. Modern infrastructure and smart funding 3.1 Transport infrastructure: territorial cohesion and economic growth Initiative 35: Multimodal freight corridors for sustainable transport networks

B

			Passenger						Freight							Sectoral				
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overal	Aggricultural	Industrial	Transport	Other Services
Indirect Traffic Impacts	7	Volume [passenger/tons]	⇒	⇒	⇒	⇒	⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒					
	8	Transport performance [vkm]	⇒	⇒	⇒	⇒	⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒					
	9	Transport performance [pkm/tkm]	⇒	⇒	⇒	⇒	⇒		⇒	⇒	⇒	⇒	⇒	⇒	⇒					
Direct Traffic Impacts	10	Travel time [min]																		
	11	Travel distance [km]																		
	12	Out of pocket costs [EUR/vkm]	↘	↘	↘	↘	↘		↘	↘	↘	↘	↘	↘	↘					
	13	Other cost components [EUR/vkm]	↗	↗	↗	↗	↗		↗	↗	↗	↗	↗	↗	↗					
	14	Qualitative effects (e.g. liability, ...)																		
	15	Comments	Marginal effects expected for all modes affected																	
Direct Economical Impacts	16	Economic growth [gdp]														⇒	⇒	⇗	⇒	⇒
	17	Employment [#employed]														⇒	⇒	⇗	⇒	⇒
	18	Resources: Energy														⇒	⇒	⇗	↘	⇒
	19	Resources: Material														⇒	⇒	⇒	⇒	⇒
	20	Other																		
	21	Comments																		
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]	↘	↘	↘	↘	↘		↘	↘	↘	↘	↘	↘	↘					
	23	Other																		
	24	Comments																		
Direct Environmental Impacts	25	GHG emissions [g/vkm]	↘	↘	↘	↘	↘		↘	↘	↘	↘	↘	↘	↘					
	26	(Local) air pollution [g/vkm]	↘	↘	↘	↘	↘		↘	↘	↘	↘	↘	↘	↘					
	27	Other																		
	28	Comments	Marginal penetration of retrofitting may still strongly affect emissions as old technolgoies can be very polluting.																	

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	✓	X	X	✓	✓	✓

TPM policy levers		
	30	Demography: n/a
	31	Economy & Resources: i_er_delta_rtd
	32	Passenger Demand: n/a
	33	Freight Demand: p_fd_load_factor, p_fd_speed, p_fd_load_capacity
	34	Vehicle Stock: i_vs_veh_stock (fleet portfolio), i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (vehicle capital costs)
	35	Environment: i_ev_emfactor (emission and/or fuel consumption factors)
	36	Safety: i_sa_speed_car, i_sa_dui_car (driving under influence), i_sa_distraction_car (distraction (by device)), i_sa_fatigue_car, i_sa_restraint_car (belt use & child restraints), i_sa_veh_defect_car, i_sa_speed_truck, i_sa_dui_truck (driving under influence), i_sa_distraction_truck (distraction (by device)), i_sa_fatigue_truck, i_sa_restraint_truck (belt use & child restraints), i_sa_blind_spot_truck, i_sa_veh_defect_truck, i_sa_speed_p2w, i_sa_dui_p2w (driving under influence), i_sa_distraction_p2w (distraction (by device)), i_sa_fatigue_p2w, i_sa_veh_defect_p2w i_sa_speed_pt, i_sa_dui_pt (driving under influence), i_sa_distraction_pt (distraction (by device)), i_sa_fatigue_pt, i_sa_veh_defect_pt i_sa_speed_bike, i_sa_dui_bike (driving under influence), i_sa_distraction_bike (distraction (by device)), i_sa_fatigue_bike, i_sa_veh_defect_bike i_sa_crew_error_rail (driver and train crew errors), i_sa_stock_fault_rail (rolling stock faults) i_sa_engine_failure_air, i_sa_crew_error_air i_sa_tech_failure_air (excl. engine) i_sa_runway_collision_air, i_sa_fire_air, i_sa_mid-air_collision_air, i_sa_load_error_air i_sa_fat_risk_sss (fatality risk short sea) i_sa_fat_risk_iww (fatality risk iww)
	37	Comments: See as well TPM 58 TIS Managment Services and 63.1 Car Replacement.
	47	References: Campling, P., Van Den Bossche, K., Duerinck, J., Deutsch, F, Veldeman, N., Janssen, S., Janssens, L., Lodewijks, P., Vanherle, K., Van Zeebroeck, B., Pallemaerts, M., Van Hyfte, A. (2010). Market-based instruments for reducing air pollution-assessment ofpolicy options to reduce air pollution from shipping, Final Report for the European Commission's DG Environment, June 2010. Safety: see references listed at TPMs of the various modes
	48	Performed by: TML

1.1.26 HDV Infrastructure Charge (98)

Section				
A		0	Policy name	HDV infrastructure charge
		1	Policy Area	1 Pricing
		2	Policy Category	Pricing
		3	Policy Subcategory	1.1 Infrastructure charging / access restrictions scheme
		4	Transport Policy Measure	Phase in a mandatory infrastructure charge for heavy-duty vehicles (HDV). The scheme would introduce a common tariff structure and cost components such as the recovery of wear and tear, noise and local pollution costs to replace the existing user charges.
		5	Main Targets	Improve transport efficiency, lower fuel consumption and CO2 emissions, reduce empty runnings and improve load factors.
		6	White Paper Reference	3. Modern infrastructure and smart funding 3.3 Getting prices right and avoiding distortions Initiative 39: Smart pricing and taxation

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]							⇗		↘		⇗	⇗	
	8	Transport performance [vkm]							⇗		↘		⇗	⇒	
	9	Transport performance [pkm/tkm]							⇗		↘		⇗	⇗	
Direct Traffic Impacts	10	Travel time [min]													
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]									⇗				
	13	Other cost components [EUR/vkm]													
	14	Qualitative effects (e.g. liability, …)													
	15	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
	14	Qualitative effects (e.g. liability, …)					
	15	Comments					
Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇒	⇒
	17	Employment [#employed]	⇒	⇒	⇒	⇒	⇒
	18	Resources: Energy				↘	
	19	Resources: Material					
	20	Other					
	21	Comments					
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]					
	23	Other					
	24	Comments					
Direct Environmental Impacts	25	GHG emissions [g/vkm]					
	26	(Local) air pollution [g/vkm]					
	27	Other					
	28	Comments					

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	X	X	✓	✓	X	X

TPM policy levers		
30	Demography	n/a
31	Economy & Resources	n/a
32	Passenger Demand	n/a
33	Freight Demand	p_fd_load_factor, i_fd_toll_cost
34	Vehicle Stock	i_vs_nf_rof_cst_othr (other cost or charges for trucks)
35	Environment	n/a
36	Safety	n/a
37	Comments	
47	References	European Comission (2011): Directive 2011/76/EU of the European Parliament and of the Council of 27 September 2011 amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures. European Commission (2013): Commission Staff Working Document - Ex-post evaluation of Directive 1999/62/EC, as amended, on the charging of heavy goods vehicles for the use of vertain infrastructures. European Commission (2014): Strategy for reducing Heavy-Duty Vehicles' fuel consumption and CO2 emissions, COM(2014) 285 final.
48	Performed by	KIT

1.1.27 Internalisation of External Costs (100)

Section			
A	0	Policy name	Internalisation of external costs
	1	Policy Area	1 Pricing
	2	Policy Category	Pricing
	3	Policy Subcategory	1.1 Infrastructure charging 1.2 External cost charges 2.1 Fuel taxation
	4	Transport Policy Measure	Proceed with the internalisation of external costs for all modes of transport applying common principles while taking into account the specificity of each mode.
	5	Main Targets	Internalisation of external costs for all transport modes.
	6	White Paper Reference	3. Modern infrastructure and smart funding 3.3 Getting prices right and avoiding distortions Initiative 39: Smart pricing and taxation

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]	⇗	⇒	⇒	↘	⇒	⇗	⇒	⇒	⇒	⇒	⇒	⇒	⇒
	8	Transport performance [vkm]	⇗	⇒	⇒	↘	⇒	⇗	⇒	⇒	⇒	⇒	⇒	⇒	⇒
	9	Transport performance [pkm/tkm]	⇗	⇒	⇒	↘	⇒	⇗	⇒	⇒	⇒	⇒	⇒	⇒	⇒
Direct Traffic Impacts	10	Travel time [min]													
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]	⇗	⇗	⇗	⇗	⇗		⇗	⇗	⇗	⇗	⇒	⇗	⇗
	13	Other cost components [EUR/vkm]	⇗	⇗	⇗	⇗	⇗		⇗	⇗	⇗	⇗	⇗	⇗	⇗
	14	Qualitative effects (e.g. liability, …)													
	15	Comments	Rail will benefit most from implementation of the internalisation of external costs for all modes. The aviation sector will most likely be struck harder. For air the emission scheme is already active, noise protection programs are paid by the airports (respectively users, noise dependend landing fees). Infrastructure subsidies are regulated, at large airports not allowed, for small airports possible due to cohesion policy. For road there are tolls and fuel taxes, and vehicle taxes (ccm / power dependent) but no emission scheme applies. For rail there are track charges and fuel tax but no emission scheme applies. For sea and ports the internalisation of external costs are expressed through sea and port standards for low SOx, NOx, noise, waste, litter, short side electricity (berth) and alternative fuel charging at ports (zero-emission ships) . These are expected to have a strong effect on costs (equipment and infrastructure costs, fuel costs etc.) For IWW no affecting policy for inland waterways and therefore no expected additional costs. The EC will develop an approach to internalise IWW external costs by 2020 and will later examine this proposal.												
Direct Economical Impacts	16	Economic growth [gdp]													
	17	Employment [#employed]													
	18	Resources: Energy													
	19	Resources: Material													
	20	Other													
	21	Comments													
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
	23	Other													
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other													
	28	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	↘	⇒
	17	Employment [#employed]	⇒	⇒	⇒	↘	⇒
	18	Resources: Energy				↘	
	19	Resources: Material					

C

			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
TPM translation	29	HT Modules addressed by TPM	X	X	✓	✓	✓	X	X

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	i_pd_core_toll_cost
	33	Freight Demand	i_fd_toll_costs
	34	Vehicle Stock	i_vs_nf_taxfuel (fuel tax)
	35	Environment	n/a
	36	Safety	n/a
	37	Comments	
	47	References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet No. 4 (Kritzinger et al., 2013), Fact Sheet No. 9, Fac Sheet No.2.
	48	Performed by	KIT

1.1.28 Circulation Tax for Cars (102)

Section				
A		0	Policy name	Circulation tax for cars
		1	Policy Area	2 Taxation
		2	Policy Category	Pricing
		3	Policy Subcategory	2.2 Transport taxation
		4	Transport Policy Measure	Vehicle taxation (circulation & registration taxes). Policy set to simulate the implementation of common rules for annual car circulation taxes based on CO2 emissions and the phase out of registration taxes at EU level in order to encourage the use of fuel efficient cars.
		5	Main Targets	Reducing fuel use, CO2 emission and pollution from road transport
		6	White Paper Reference	3.3. Getting prices right and avoiding distortions, i.e. (39) Smart pricing and taxation

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]		⇒	⇒					⇒	⇒				
		8	Transport performance [vkm]		⇒	⇒					⇒	⇒				
		9	Transport performance [pkm/tkm]		⇒	⇒					⇒	⇒				
	Direct Traffic Impacts	10	Travel time [min]													
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]		⇒	⇒					⇒	⇒				
		13	Other cost components [EUR/vkm]													
		14	Qualitative effects (e.g. liability, ...)													
		15	Comments													

				Sectoral				
				Overall	Aggricultural	Industrial	Transport	Other Services
	Direct Economical Impacts	16	Economic growth [gdp]				⇒	
		17	Employment [#employed]					
		18	Resources: Energy					
		19	Resources: Material					
		20	Other					
		21	Comments					
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]					
		23	Other					
		24	Comments					
	Direct Environmental Impacts	25	GHG emissions [g/vkm]					
		26	(Local) air pollution [g/vkm]					
		27	Other					
		28	Comments					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	X	X	X	X	✓	X	X

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	n/a
	33	Freight Demand	n/a
	34	Vehicle Stock	i_vs_nf_rof_cst_othr (vehicle costs or other task)
	35	Environment	n/a
	36	Safety	n/a
	37	Comments	
	47	References	ASSIST fact sheet no.10.
	48	Performed by	TML

1.1.29 Improving Local Public Transport (109)

Section A

0	Policy name	Improving local public transport
1	Policy Area	6 Infrastructure
2	Policy Category	Efficiency standards and flanking measures
3	Policy Subcategory	6.3 Capacity and quality of transport systems
4	Transport Policy Measure	Policy set to simulate an improvement of frequency and reliability of public transport services (bus or train), in terms of reduction of travel time at local level.
5	Main Targets	Enable attractive frequencies, comfort, easy access, and intermodal integration to reduce travel time at local level. Promoting of local multimodality by increasing the awareness on the availability of alternative modes and possible combinations of modes for single routes (car sharing, bike sharing, local public transport)
6	White Paper Reference	1. An efficient and integrated mobility system 1.5 Service quality and reliability Initiative 22: Seamless door-to-door mobility

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]		↘			⇗	⇒							
	8	Transport performance [vkm]		↘			⇗	⇒							
	9	Transport performance [pkm/tkm]		↘			⇗	⇒							
Direct Traffic Impacts	10	Travel time [min]					↘	⇒							
	11	Travel distance [km]					⇗	⇒							
	12	Out of pocket costs [EUR/vkm]					↘	⇒							
	13	Other cost components [EUR/vkm]													
	14	Qualitative effects (e.g. liability, ...)	Improvement in level of service for bus and train												
	15	Comments													

Sectoral					
Overall	Aggricultural	Industrial	Transport	Other Services
⇗			⇗	

Direct Economical Impacts	16	Economic growth [gdp]					⇗	
	17	Employment [#employed]					⇗	
	18	Resources: Energy						
	19	Resources: Material						
	20	Other						
	21	Comments						
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]		↘				
	23	Other						
	24	Comments						
Direct Environmental Impacts	25	GHG emissions [g/vkm]						
	26	(Local) air pollution [g/vkm]					⇒	
	27	Other						
	28	Comments						

C

TPM translation		Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29 HT Modules addressed by TPM	X	X	✓	X	X	X	X

TPM policy levers		
30	Demography	n/a
31	Economy & Resources	n/a
32	Passenger Demand	i_pd_urban_duaetime, i_pd_urban_dutraveldist, i_pd_urban_traveltime
33	Freight Demand	n/a
34	Vehicle Stock	n/a
35	Environment	n/a
36	Safety	n/a
37	Comments	
47	References	European Commission (2013), Study to support an impact assessment of the urban mobility package. European Commission (2012), Study on the
48	Performed by	KIT

1.1.30 CO_2 Certificate System for Road Transport (110)

Section A

0	Policy name	CO2 certificate system for road transport
1	Policy Area	3 Research and innovation
2	Policy Category	Pricing
3	Policy Subcategory	3.2.2 Promotion and incentives
4	Transport Policy Measure	Policy set to simulate the implementation of a CO2 certificate system for road. A certificate price in constant Euro's (2005) per ton CO2 can be implemented and the trend for this price over the future time period can be defined. The certificate price is converted in an additional cost by fuel type (depending on their CO2 specific emission factor), which is applied to all road modes.
5	Main Targets	Reduction of CO2 emission from car or road transport
6	White Paper Reference	2.1. A European transport research and innovation policy, i.e. (26) A regulatory framework for innovative transport, and also 2.2. Promoting more sustainable behaviour,.i.e. (28) Vehicle labelling for CO2 emissions and fuel efficiency.

B

			Passenger						Freight							Sectoral				
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
Indirect Traffic Impacts	7	Volume [passenger/tons]		⇒	⇒	⇒	⇒			⇒	⇒	⇒	⇒	⇒	⇒					
	8	Transport performance [vkm]		⇒	⇒	⇒	⇒			⇒	⇒	⇒	⇒	⇒	⇒					
	9	Transport performance [pkm/tkm]		⇒	⇒	⇒	⇒			⇒	⇒	⇒	⇒	⇒	⇒					
Direct Traffic Impacts	10	Travel time [min]																		
	11	Travel distance [km]																		
	12	Out of pocket costs [EUR/vkm]		⇒	⇒	⇒	⇒			⇒	⇒	⇒	⇒	⇒	⇒					
	13	Other cost components [EUR/vkm]																		
	14	Qualitative effects (e.g. liability, …)																		
	15	Comments																		
Direct Economical Impacts	16	Economic growth [gdp]														⇒			⇒	
	17	Employment [#employed]																		
	18	Resources: Energy														⇒			⇒	
	19	Resources: Material																		
	20	Other																		
	21	Comments																		
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																		
	23	Other																		
	24	Comments																		
Direct Environmental Impacts	25	GHG emissions [g/vkm]		↘	↘	↘	↘			↘	↘	↘	↘							
	26	(Local) air pollution [g/vkm]		⇒	⇒	⇒	⇒			⇒	⇒	⇒	⇒							
	27	Other																		
	28	Comments																		

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	✓	X	X	✓	X	X

TPM policy levers		
30	Demography	n/a
31	Economy & Resources	i_er_delta_pd_cost
32	Passenger Demand	n/a
33	Freight Demand	n/a
34	Vehicle Stock	i_vs_fu_exduty_eur_1000l (fuel costs)
35	Environment	n/a
36	Safety	n/a
37	Comments	
47	References	STARK; DIETRICH; LECHNER; SONNTAG; MAIER; SAMMER, Potentials and Effects of a European-wide CO2-Certificate Trading Scheme upon Road Traffic in Austria, 45th ISOCARP Congress 2009
48	Performed by	TML

1.1.31 CO_2 Feebates for Road Transport (111)

Section A

0	Policy name	CO2 feebates for road transport
1	Policy Area	3 Research and innovation
2	Policy Category	Pricing
3	Policy Subcategory	3.2.2 Promotion and incentives
4	Transport Policy Measure	Policy set to simulate the implementation of a feebates for road transport to stimulate the diffusion of low emission, fuel efficient and alternative fuel vehicles. A system offering rebates for purchasers of clean vehicles and in parallel setting fees for vehicles emitting more CO2 than a certain threshold is called feebates.
5	Main Targets	Lowering CO2 emission level from vehicles by providing a price incentive towards cars with lower CO2 emission levels
6	White Paper Reference	2.1. A European transport research and innovation policy, i.e. (26) A regulatory framework for innovative transport, and also 2.2. Promoting more sustainable behaviour,.i.e. (28) Vehicle labelling for CO2 emissions and fuel efficiency

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]		⇒	⇒					⇒	⇒				
	8	Transport performance [vkm]		⇒	⇒					⇒	⇒				
	9	Transport performance [pkm/tkm]		⇒	⇒					⇒	⇒				
Direct Traffic Impacts	10	Travel time [min]													
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]		⇒	⇒					⇒	⇒				
	13	Other cost components [EUR/vkm]													
	14	Qualitative effects (e.g. liability, …)													
	15	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]				⇒	
	17	Employment [#employed]					
	18	Resources: Energy				⇒	
	19	Resources: Material					
	20	Other					
	21	Comments					

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
	23	Other													
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]		↘	↘					↘	↘				
	26	(Local) air pollution [g/vkm]		⇒	⇒					⇒	⇒				
	27	Other													
	28	Comments													

C

		TPM translation	Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	X	X	X	✓	X	X

		TPM policy levers	
	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	n/a
	33	Freight Demand	n/a
	34	Vehicle Stock	i_vs_veh_stock (fleet portfolio), i_vs_cap_rpcs_mkt (vehicle costs with VAT), i_vs_cap_tech, i_vs_nf_rof_cst_othr (other taxes)
	35	Environment	n/a
	36	Safety	n/a
	37	Comments	

	47	References	1. Davis, William, Levine, Mark, Train, Kenneth, and Duleep, K.G., "Effects of Feebates on Vehicle Fuel Economy, Carbon Dioxide Emissions, and Consumer Surplus", DOE/PO-0031, U.S. DOE. February 1995. 2. German, John and Meszler, Dan, " Best Practices for Feebate Program Design and Implementation", ICCT. April 2010. 3. Greene, David, Patterson, Phillip, Singh, Margaret, and Li, Jia, "Feebates, rebates and gas-guzzler taxes: a study of incentives for increased fuel economy", Energy Policy, vol. 33, pp. 757-775. 2005. 4. Greene, David and Brunch, David, "Potential Design, Implementation, and Benefits of a Feebate Program for New Passenger Vehicles in California", prepared for State of California Air Resources Board by University of California-Davis. February 2011. 5. McManus, Walter, "Economic Analysis of Feebates to Reduce Greenhouse Gas Emissions from Light Vehicles for California", University of Michigan. May 2007. 6. Nemry et al. Feebate and scrappage policy instrument. European Commission, Joint Research Centre 2009.
	48	Performed by	TML

1.2 TPM Templates already embedded in the EC Reference Scenario 2013

1.2.1 Opening the Internal Rail Market (1)

Section				
A		0	Policy name	Opening the internal rail market
		1	Policy Area	5 Internal market
		2	Policy Category	Internal market
		3	Policy Subcategory	5.1.2 Rail - internal market
		4	Transport Policy Measure	Open the domestic rail passengers market to competition, including mandatory award of public service contracts under competitive tendering.
		5	Main Targets	Open the domestic rail passengers market to competion to improve the attractiveness, competitiveness and service quality of passenger railway transportation. Community railway liberalisation SEC(2004)236, COM(2004)139 Policy set to simulate the EU open competition between rail passenger operators and the availability of an integrated Europe-wide railway network, assuming an impact on travel time and costs of passenger transport.
		6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 1: A true internal market for rail services

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]	⇑		↘				⇒						
		8	Transport performance [vkm]	⇑		↘				⇒						
		9	Transport performance [pkm/tkm]	⇑		↘				⇒						
	Direct Traffic Impacts	10	Travel time [min]													
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]	↘												
		13	Other cost components [EUR/vkm]													
		14	Qualitative effects (e.g. liability, ...)	Qualitative increase possible.												
		15	Comments	For freight demand the impact on tonnes and tkm is marginal. The only input parameter possibly affected could be the wait times (due to frequency increase of passenger trains). The policy is not related to travel times and distance or any types of costs).												
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other													
		21	Comments	Government saves money in puplic procurements.												
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]	⇒						⇒						
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]	⇗		↘										
		26	(Local) air pollution [g/vkm]	⇗		↘										
		27	Other													
		28	Comments													

		Sectoral				
		Overall	Aggricultural	Industrial	Transport	Other Services
16	Economic growth [gdp]	⇒	⇒	⇒	⇗	⇒
17	Employment [#employed]	⇒	⇒	⇒	⇗	⇒
18	Resources: Energy					
19	Resources: Material					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	X	X	✓	✓	✓	X	X

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	i_pd_ae_time_weight, i_pd_imp_delta_los (level of service)
	33	Freight Demand	p_fd_wait_time (due to frequency increase of passenger trains)
	34	Vehicle Stock	i_vs_nf_rail_othc (non fuel operational cost)
	35	Environment	n/a
	36	Safety	n/a
	37	Comments	Quantification requires knowing passenger network utilisation rate change, this would require knowing what part of PKM/trip growth is the result of more trains. As HIGH-TOOL does not apply assignment routines the increased wait time effect must be defined by the user.
	47	References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet 23 (Kritzinger et al., 2013)
	48	Performed by	KIT

1.2.2 Access to Rail Infrastructure (4)

Section A

0	Policy name	Access to rail infrastructure
1	Policy Area	5 Internal market
2	Policy Category	Internal market
3	Policy Subcategory	5.1.2 Rail - internal market
4	Transport Policy Measure	Ensure effective and non-discriminatory access to rail infrastructure, including rail-related services, in particular through structural separation between infrastructure management and service provision.
5	Main Targets	Improve non-discriminatory access to rail infrastructure to enhance competition in the rail market.
6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 1: A true internal market for rail services

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]	⇗		⇘	⇘			⇒						
	8	Transport performance [vkm]	⇗		⇘	⇘			⇒						
	9	Transport performance [pkm/tkm]	⇗		⇘	⇘			⇒						
Direct Traffic Impacts	10	Travel time [min]	⇘						⇒						
	11	Travel distance [km]													
	12	Out of pocket costs [EUR/vkm]													
	13	Other cost components [EUR/vkm]	⇘						⇒						
	14	Qualitative effects (e.g. liability, …)	Reduces number of transfer and increases the service level (waiting time, same operator, online connection).												
	15	Comments	This policy mainly refers to the domestic market and passenger transport. The impact on rail (freight) is expected to be marginal for short/ medium distances.												

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇗	⇒
	17	Employment [#employed]	⇒	⇒	⇒	⇗	⇒
	18	Resources: Energy					
	19	Resources: Material					
	20	Other					
	21	Comments	Assuming the total demand for transport increase despite of modal shift.				

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
	23	Other													
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other													
	28	Comments													

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	X	✓	✓	✓	X	X

TPM policy levers		
30	Demography	n/a
31	Economy & Resources	n/a
32	Passenger Demand	i_pd_ae_time_weight, i_pd_imp_delta_los (level of service)
33	Freight Demand	p_fd_wait_time
34	Vehicle Stock	i_vs_nf_rail_othc (non fuel operational cost)
35	Environment	n/a
36	Safety	n/a
37	Comments	Freight is effected indirectly due to frequency increase of passenger trains.
47	References	European Commission (1991): Council Directive of 29 July 1991 on the development of the COmmunity's railways European Commission (2009): Proposal for a Directive of the European Parliament and of the Council Amending, Council Directive 91/440/EEC on the development of the Community's railways Further policy developments for the future: Third and fourth railway package. European Commission (2013): The Fourth Railway Package - Completing the Single European Railway Area to Foster European Competitiveness and Growth Steer Davies Gleave (2012): Further Action at European Level Regarding Market Opening for Domestic Passenger Transport by Rail and Ensuring Non-Discreminitory Access to Rail Infrastructure and Services, London.
48	Performed by	

1.2.3 Single European Sky (6)

Section A			
	0	Policy name	Single European Sky
	1	Policy Area	3 Research and innovation / 6 Infrastructure
	2	Policy Category	Internal market
	3	Policy Subcategory	3.1.3 Technology 6.3 Capacity and quality of transport systems
	4	Transport Policy Measure	Deploy the future air traffic management system (SESAR) in the agreed timeframe
	5	Main Targets	Enable the Single European Sky, i.e. tripling air space capacity in Europe; increase safety in air transport by a power of ten, decrease emissions of air transport by 10%; decrease applying ATM costs by at least 50%.
	6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 2: Completion of the Single European Sky

B

			Passenger						Freight						
			Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
Indirect Traffic Impacts	7	Volume [passenger/tons]	↘		↘	⇗					↘	⇗			
	8	Transport performance [vkm]	↘		↘	⇗					↘	⇗			
	9	Transport performance [pkm/tkm]	↘		↘	⇗					↘	⇗			
Direct Traffic Impacts	10	Travel time [min]				↘						↘			
	11	Travel distance [km]				↘						↘			
	12	Out of pocket costs [EUR/vkm]				⇒						⇒			
	13	Other cost components [EUR/vkm]				↘						↘			
	14	Qualitative effects (e.g. liability, …)	Decrease of delays and cancelled flights												
	15	Comments	Impacts on surface transport might be covered by other effects (increase of access / egress traffic). The additional flight capacity enabled by SESAR would allow continued mobility of people and goods within the European Economic Area and with the rest of the World. Continued mobility and convenience would help to reinforce the EU internal market, as well as promote greater EU cohesion.												
Direct Economical Impacts	16	Economic growth [gdp]													
	17	Employment [#employed]													
	18	Resources: Energy													
	19	Resources: Material													
	20	Other	Additional creation of indirect and induced employment												
	21	Comments	Employment in ATM stays constant (traffic growth compensates), demand generation effect in air larger than the demand reduction of other modes.												
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]				↘						↘			
	23	Other	Also noise reduction by up to 10% in vicinity of airports intended												
	24	Comments													
Direct Environmental Impacts	25	GHG emissions [g/vkm]													
	26	(Local) air pollution [g/vkm]													
	27	Other													
	28	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
Direct Traffic Impacts	14	Qualitative effects (e.g. liability, …)					
	15	Comments					
Direct Economical Impacts	16	Economic growth [gdp]				⇗	
	17	Employment [#employed]				⇗	
	18	Resources: Energy				⇒	
	19	Resources: Material					
	20	Other					
	21	Comments					

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	X	✓	X	✓	X	✓

TPM policy levers		
30	Demography	n/a
31	Economy & Resources	n/a
32	Passenger Demand	i_pd_link_time_weight, i_pd_imp_delta_los (level of service)
33	Freight Demand	n/a
34	Vehicle Stock	i_vs_nf_air_neoe_pas, i_vs_nf_air_neoe_fre (non energy related variable costs)
35	Environment	n/a
36	Safety	i_sa_runway_collision_air, i_sa_mid_air_collision_air
37	Comments	Air cargo within Europe is of minor importance compared to the intercontinental volume and value of goods transported. Therefore the air cargo demand is driven by GVA and the necessity of fast and reliable transport on long distances.
47	References	https://www.atmmasterplan.eu/ http://81.47.175.201/compass/index.php?option=com_content&view=article&id=467:1401-single-european-sky-atm-research-sesar&catid=19:management SESAR, European ATM Master Plan Edition 2, 2012 SESAR, SESAR focus: Airports-the ATM bottleneck?, 2011 SESAR, Presentation of the McKinsey Macro-Economic study, 2011 Safety: Ministerie van Verkeer en Waterstaat, Causal
48	Performed by	MKmetric

1.2.4 Enhance Service Quality at Airports (8)

Section				
A		0	Policy name	Enhance sercice quality at airports
		1	Policy Area	5 Internal market
		2	Policy Category	Internal market
		3	Policy Subcategory	5.1.5 Air internal market 6.3 Capacity and quality of transport systems
		4	Transport Policy Measure	Clarify and improve conditions to enter and provide quality services, including groundhandling: ensure that all actors in an airport system meet minimum quality standards.
		5	Main Targets	Enable access to airport infrastructure at a fair price to airlines. Improve aviation security checks at airports for the benefit of passengers and other stakeholders. Encourage investments, especially through the use of innovative financial instruments, so as to steer growth, secure cohesion within the EU and enhance its economic, societal and cultural links with the rest of the world.
		6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 3: Capacity and quality of airports

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]	⇘			⇗						⇗			
		8	Transport performance [vkm]													
		9	Transport performance [pkm/tkm]	⇘			⇗						⇗			
	Direct Traffic Impacts	10	Travel time [min]				⇘						⇘			
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]				⇘						⇘			
		13	Other cost components [EUR/vkm]													
		14	Qualitative effects (e.g. liability, ...)	Equal quality standards across the EU increases the average service and comfort level.												
		15	Comments	While travel / transport time and cost savings can lead to possitive effects on medium and large airports, the effects might not exist or even be reverse at small airports e.g. due to oversized security installments, costly standardisation proceses.												
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other	Can supports cohesion in the EU if the regulation allows a differentiation for small airports.												
		21	Comments	Comfort improves societal and cultural links to other regions.												
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]				⇒						⇒			
		26	(Local) air pollution [g/vkm]				⇘						⇘			
		27	Other													
		28	Comments	Fixed energy systems for aircrafts at airports reduce the alternative usage of their auxiliary power unit resulting in less local emissions.												

		Sectoral				
		Overall	Aggricultural	Industrial	Transport	Other Services
14	Qualitative effects (e.g. liability, ...)					
15	Comments					
16	Economic growth [gdp]	⇒	⇒	⇒	⇗	⇒
17	Employment [#employed]	⇒	⇒	⇒	⇗	⇒
18	Resources: Energy					
19	Resources: Material					
20	Other					
21	Comments					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	✗	✗	✓	✓	✓	✗	✗
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	i_pd_ae_time_weight, i_pd_imp_delta_los (level of service)						
		33	Freight Demand	p_fd_wait_time, p_fd_load_time, p_fd_unload_time, p_fd_speed (to handle time impedance indirectly)						
		34	Vehicle Stock	i_vs_nf_air_neoe_pas, i_vs_nf_air_neoe_fre (non energy related variable costs)						
		35	Environment	n/a						
		36	Safety	n/a						
		37	Comments							
		47	References	http://ec.europa.eu/transport/modes/air/airports/policy_en.htm http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0819:FIN:EN:HTML						
		48	Performed by	MKmetric						

1.2.5 Single European Road Market (16)

Section				
A		0	Policy name	Single European road market
		1	Policy Area	5 Internal market
		2	Policy Category	Internal market
		3	Policy Subcategory	5.1.1 Road internal market
		4	Transport Policy Measure	Elimination of restrictions on road cabotage
		5	Main Targets	Establish a single European road transport market by eliminating the restrictions on cabotage, and thus full liberalisation.
		6	White Paper Reference	1. An efficient and integrated mobility system 1.1 A Single European Transport Area Initiative 6: Road freight

B				Passenger						Freight							
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]							↘		↗	⇒			
		8	Transport performance [vkm]							↘		↘	⇒			
		9	Transport performance [pkm/tkm]							↘		↘	⇒			
	Direct Traffic Impacts	10	Travel time [min]													
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]									↘				
		13	Other cost components [EUR/vkm]									↘				
		14	Qualitative effects (e.g. liability, ...)													
		15	Comments	Less vehicle-kilometres without load (empty runnings) and accordingly total vehicle kilometres but cost reductions make road transport more atractive.												
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other													
		21	Comments	Total vehicle km may reduce. Total tkm/pkm by road might increase, due to the cost reduction in road transport. Therefore, the impact on GVA, employment, or energy use of transport sector is not foreseeable.												
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]													
		26	(Local) air pollution [g/vkm]													
		27	Other													
		28	Comments													

				Sectoral				
				Overall	Aggricultural	Industrial	Transport	Other Services
	Economical Impacts	16	Economic growth [gdp]	⇒	⇒	⇒	⇒	⇒
		17	Employment [#employed]	⇒	⇒	⇒	⇒	⇒
		18	Resources: Energy	⇒	⇒	⇒	⇒	⇒
		19	Resources: Material					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	✗	✗	✗	✓	✓	✗	✗

	TPM policy levers	30	Demography	n/a
		31	Economy & Resources	n/a
		32	Passenger Demand	n/a
		33	Freight Demand	p_fd_load_factor (Average load rate)
		34	Vehicle Stock	i_vs_nf_mar_opcost (non fuel operational cost)
		35	Environment	n/a
		36	Safety	n/a
		37	Comments	
		47	References	ASSIST Deliverable 2.1: Assessment of the Social and Economic Impacts of Transport Policy Measures, Fact Sheet No. 22(Kritzinger et al., 2013). Innovation Processes in Surface Transport - InnoSuTra (2010): Preliminary Innovation Report (PIR), Deliverable D 2.1. Vellay, C. Volny, M. Winder, A. (2010): Several scenarios of long distance freight transport by 2050 and their impact on environmental emissions, dependence on fossil fuels, congestions and accidents. Deliverable 6.1 of FREIGHTVISION. Suggested TPM exceeds the existing Regulation No 1072/2009 (http://ec.europa.eu/transport/modes/road/haulage/doc/qa_the_new_cabotage_regime_2011.pdf
		48	Performed by	KIT

1.2.6 Improvement of Energy Efficiency of Vehicles (50)

Section				
A		0	Policy name	Improvement of energy efficiency of vehicles
		1	Policy Area	3 Research and innovation
		2	Policy Category	Research and innovation
		3	Policy Subcategory	3.1.1 Vehicle Technology
		4	Transport Policy Measure	Technological innovation on vehicle efficiency through new engines, materials and design
		5	Main Targets	Further improvement of energy efficiency of all vehicles; reduce CO2-emissions, decrease energy demand.
		6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.1 A European Transport Research and Innovation Policy Initiative 24: A technology roadmap

B				Passenger						Freight							Sectoral				
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
	Indirect Traffic Impacts	7	Volume [passenger/tons]							⇒		⇒		⇒	⇒	⇒					
		8	Transport performance [vkm]																		
		9	Transport performance [pkm/tkm]																		
	Direct Traffic Impacts	10	Travel time [min]																		
		11	Travel distance [km]																		
		12	Out of pocket costs [EUR/vkm]	↘	↘	⇒	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘					
		13	Other cost components [EUR/vkm]	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗					
		14	Qualitative effects (e.g. liability, ...)																		
		15	Comments	Out of pocket costs should decrease due to the costs of the implemented technology. These costs are especially in the investment or capital costs which can be integrated to the car or vehicle prices for example.																	
	Direct Economical Impacts	16	Economic growth [gdp]														⇒	⇒	⇗	⇒	⇒
		17	Employment [#employed]														⇒	⇒	⇗	⇒	⇒
		18	Resources: Energy														⇒	⇒	⇗	⇘	⇒
		19	Resources: Material														⇒	⇒	⇒	⇒	⇒
		20	Other																		
		21	Comments																		
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																		
		23	Other																		
		24	Comments																		
	Direct Environmental Impacts	25	GHG emissions [g/vkm]	⇓	⇓	⇓	⇓	⇓		⇓	⇓	⇓	⇓	⇓	⇓	⇓					
		26	(Local) air pollution [g/vkm]		↘	↘	↘	↘		↘	↘	↘	↘	↘	↘						
		27	Other																		
		28	Comments																		

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	X	X	X	X	✓	✓	X
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	n/a						
		33	Freight Demand	n/a						
		34	Vehicle Stock	i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (vehicle tech related capital costs)						
		35	Environment	i_ev_emfactor (emission and/or fuel consumption factors)						
		36	Safety	n/a						
		37	Comments							
		47	References	COM(2013)17 and COM(2013)18. TREMOVE simulations on C02 & EURO-standards (several references: http://www.tmleuven.be/methode/tremove/home.htm)						
		48	Performed by	TML						

1.2.7 New Fuels and Propulsion Systems (51)

Section			
A	0	Policy name	New fuels and propulsion systems
	1	Policy Area	3 Research and innovation
	2	Policy Category	Research and innovation
	3	Policy Subcategory	3.1.1 Vehicle Technology
	4	Transport Policy Measure	Technological innovation on new fuels and propulsion systems to achieve cleaner energy use for all modes of passenger and freight transport.
	5	Main Targets	Increase adoption of next generation biofuels; increased penetration of electric vehicles and other propulsion systems (CNG, LPG,…)
	6	White Paper Reference	2. Innovating for the future: technology and behaviour 2.1 A European Transport Research and Innovation Policy Initiative 24: A technology roadmap

B				Passenger						Freight						
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime
	Indirect Traffic Impacts	7	Volume [passenger/tons]													
		8	Transport performance [vkm]													
		9	Transport performance [pkm/tkm]													
	Direct Traffic Impacts	10	Travel time [min]													
		11	Travel distance [km]													
		12	Out of pocket costs [EUR/vkm]	⇒	⇗	⇗	⇗	⇗		⇗	⇗	⇗	⇗	⇗	⇗	⇗
		13	Other cost components [EUR/vkm]	⇒	⇗	⇗	⇗	⇗		⇗	⇗	⇗	⇗	⇗	⇗	⇗
		14	Qualitative effects (e.g. liability, …)													
		15	Comments													
	Direct Economical Impacts	16	Economic growth [gdp]													
		17	Employment [#employed]													
		18	Resources: Energy													
		19	Resources: Material													
		20	Other													
		21	Comments													
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]													
		23	Other													
		24	Comments													
	Direct Environmental Impacts	25	GHG emissions [g/vkm]	⇒	⇓	⇓	↘	⇓		↘	⇓	⇓	↘	↘	↘	↘
		26	(Local) air pollution [g/vkm]	⇒	⇓	⇓	↘	⇓		↘	⇓	⇓	↘	↘	↘	↘
		27	Other													
		28	Comments													

			Sectoral				
			Overall	Aggricultural	Industrial	Transport	Other Services
	14	Qualitative effects (e.g. liability, …)					
	15	Comments					
Direct Economical Impacts	16	Economic growth [gdp]	↘	⇒	⇒	↘	⇒
	17	Employment [#employed]	↘	⇒	⇒	↘	⇒
	18	Resources: Energy	⇒	⇒	⇒	↘	⇒
	19	Resources: Material					
	20	Other					
	21	Comments					

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	X	X	X	X	✓	✓	X
	TPM policy levers	30	Demography	n/a						
		31	Economy & Resources	n/a						
		32	Passenger Demand	n/a						
		33	Freight Demand	n/a						
		34	Vehicle Stock	i_vs_veh_stock (fleet portfolio), i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (vehicle capital costs)						
		35	Environment	i_ev_emfactor (emission and/or fuel consumption factors)						
		36	Safety	n/a						
		37	Comments	See as well TPMs 63.2 Electric cars, 63.3 H2 cars.						
		47	References	COM(2013)17 and COM(2013)18. TREMOVE simulations on C02 & EURO-standards (several references: http://www.tmleuven.be/methode/tremove/home.htm)						
		48	Performed by	TML						

1.2.8 CO_2 Emissions Limits for Road Vehicles (64.1)

Section A			
	0	Policy name	CO2 emissions limits for road vehicles
	1	Policy Area	4 Efficiency standards and flanking measures
	2	Policy Category	Efficiency standards and flanking measures
	3	Policy Subcategory	4.1.3 Environmental standards
	4	Transport Policy Measure	CO2 emission limits for HDV, LDV and cars. Policy set to simulate restrictive limits on CO2 emissions from new vehicles (cars and trucks).
	5	Main Targets	The activation of this measure corresponds to improve the fuel efficiency of new vehicles purchased. The reduced fuel consumption results in reduced CO2 emissions from new vehicles.
	6	White Paper Reference	2.1. A European transport research and innovation policy, i.e. (26) A regulatory framework for innovative transport, and also 2.2. Promoting more sustainable behaviour,.i.e. (28) Vehicle labelling for CO2 emissions and fuel efficiency

B

				Passenger						Freight							Sectoral				
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
Indirect Traffic Impacts	7	Volume [passenger/tons]	⇗	↘	↘				⇗	↘	↘									
	8	Transport performance [vkm]	⇗	↘	↘				⇗	↘	↘									
	9	Transport performance [pkm/tkm]	⇗	↘	↘				⇗	↘	↘									
Direct Traffic Impacts	10	Travel time [min]																		
	11	Travel distance [km]																		
	12	Out of pocket costs [EUR/vkm]		⇗	⇗					⇗	⇗									
	13	Other cost components [EUR/vkm]																		
	14	Qualitative effects (e.g. liability, ...)																		
	15	Comments																		
Direct Economical Impacts	16	Economic growth [gdp]																⇒	⇒	
	17	Employment [#employed]																		
	18	Resources: Energy																⇒	⇒	
	19	Resources: Material																		
	20	Other																		
	21	Comments																		
Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																		
	23	Other																		
	24	Comments																		
Direct Environmental Impacts	25	GHG emissions [g/vkm]		↘	↘															
	26	(Local) air pollution [g/vkm]		⇒	⇒															
	27	Other																		
	28	Comments																		

C

TPM translation			Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	29	HT Modules addressed by TPM	X	X	X	X	✓	✓	X

TPM policy levers		
30	Demography	n/a
31	Economy & Resources	n/a
32	Passenger Demand	n/a
33	Freight Demand	n/a
34	Vehicle Stock	i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (car capital costs)
35	Environment	i_ev_emfactor (emission and/or fuel consumption
36	Safety	n/a
37	Comments	
47	References	ASSIST fact sheet no. 38.
48	Performed by	TML

1.2.9 Pollutant Limits for Road Vehicles (64.2)

Section				
A		0	Policy name	Pollutant limits for road vehicles
		1	Policy Area	4 Efficiency standards and flanking measures
		2	Policy Category	Efficiency standards and flanking measures
		3	Policy Subcategory	4.1.3 Environmental standards
		4	Transport Policy Measure	Standards for controlling air pollution (CO, NOx, particulate matter). Policy set to simulate restrictive limits on pollutant emissions from new vehicles (cars and trucks).
		5	Main Targets	The activation of this measure corresponds to improve the pollutant emission factors (for CO, NOx, particulate matter) related to the emission standards after Euro VI (Euro VII and more).
		6	White Paper Reference	

B				Passenger						Freight							Sectoral				
				Rail	Road (Urban)	Road (Non-Urban)	Air	Public Transport	Slow Modes	Rail	Road (Urban)	Road (Non-Urban)	Air	IWW	Short Sea	Maritime	Overall	Aggricultural	Industrial	Transport	Other Services
	Indirect Traffic Impacts	7	Volume [passenger/tons]	⇗	↘	↘				⇗	↘	↘									
		8	Transport performance [vkm]	⇗	↘	↘				⇗	↘	↘									
		9	Transport performance [pkm/tkm]	⇗	↘	↘				⇗	↘	↘									
	Direct Traffic Impacts	10	Travel time [min]																		
		11	Travel distance [km]																		
		12	Out of pocket costs [EUR/vkm]		⇗	⇗					⇗	⇗									
		13	Other cost components [EUR/vkm]																		
		14	Qualitative effects (e.g. liability, ...)																		
		15	Comments																		
	Direct Economical Impacts	16	Economic growth [gdp]																⇒	⇒	
		17	Employment [#employed]																		
		18	Resources: Energy																⇒	⇒	
		19	Resources: Material																		
		20	Other																		
		21	Comments																		
	Direct Social Impacts	22	Safety [#accidents/vkm, #fatalities/vkm]																		
		23	Other																		
		24	Comments																		
	Direct Environmental Impacts	25	GHG emissions [g/vkm]		⇒	⇒															
		26	(Local) air pollution [g/vkm]		↘	↘															
		27	Other																		
		28	Comments																		

C				Demography	Economy & Resources	Passenger Demand	Freight Demand	Vehicle Stock	Environment	Safety
	TPM translation	29	HT Modules addressed by TPM	X	X	X	X	✓	✓	X

TPM policy levers	30	Demography	n/a
	31	Economy & Resources	n/a
	32	Passenger Demand	n/a
	33	Freight Demand	n/a
	34	Vehicle Stock	i_vs_cap_rpcs_mkt (vehicle price with VAT), i_vs_cap_tech (car capital costs)
	35	Environment	i_ev_emfactor (emission and/or fuel consumption
	36	Safety	n/a
	37	Comments	
	47	References	ASSIST fact shet no. 39.
	48	Performed by	TML